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Abstract

State per capita incomes became more disperse during the contraction phase of the Great Depression, and less disperse during the recovery phase. We investigate the effects of spatial dependence, industrial composition, bank failures and fiscal policies on state income growth during each phase. We find that industrial composition and spatial interdependencies contributed to negative state income growth during the contraction, whereas New Deal spending contributed to positive state income growth during the recovery phase. We find no evidence that differences in bank failure rates or state government expenditures contributed to variation in state income growth rates.

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I. Introduction

The Great Depression was a world-wide phenomenon – few, if any, countries were unscathed. There was considerable variation across countries in the extent to which economic activity collapsed, however, and in the timing and pace of economic recovery. Similarly, while all U.S. states suffered, the extent to which per capita income declined during the contraction, and the pace and extent to which per capita income rose during the recovery, varied considerably across states. In general, states that entered the Depression with relatively low per capita incomes tended to suffer larger percentage declines in per capita income than did high income states. During the recovery, however, states that had experienced relatively large income declines tended to have larger percentage gains. Hence, state per capita incomes diverged during the contraction phase and converged during the recovery phase.

This paper investigates the sources of interstate variation in per capita income growth during the contraction and recovery phases of the Great Depression. Countless studies have used nationally aggregated data to examine the Depression as a macroeconomic phenomenon. By contrast, few studies have examined differences in state economic performance during the Depression. The considerable difference in economic performance across states, however, suggests that a complete understanding of the forces causing the Depression and bringing about recovery requires a disaggregated approach.

Many of the studies that consider regional differences in economic performance during the Great Depression focus on employment.[1] Others have sought to explain

[1] This literature has focused on whether interstate differences in employment growth were due to differences in industrial composition or other regional characteristics. Wallis (1989), for example, constructed annual state-level indices of non-agricultural and manufacturing employment for 1930-40, and estimated that industrial composition can explain only about 40 percent of state-level variation in employment during the decade. By contrast, Rosenbloom and Sundstrom (1999) focus on regional

interstate differences in bank or farm failure rates.[2] We are unaware, however, of studies that examine differences in per capita income growth across states during the Depression.[3]

By contrast, several studies have examined differences in state income growth rates since World War II. Studies have considered whether differences in state growth rates can be explained by differences in industrial composition, various public policies, cultural and ethnic differences, the influence of pressure groups, and banking conditions.[4] This literature provides a framework for our study of differences in per capita income growth during the 1930s. Our specific hypotheses, however, are motivated by prior research on the Great Depression.

The macroeconomics literature on the Great Depression attaches considerable importance to monetary and credit forces. Although not universally accepted, many scholars agree with Friedman and Schwartz's (1963) assessment that the Great Depression was a "tragic testimonial" to monetary forces. Friedman and Schwartz (1963) argue that the decline in economic activity was the result of banking panics and misguided monetary policy that caused the stock of money to fall. Bernanke (1983)

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differences in employment growth in several specific manufacturing industries over a longer period. They conclude that regional differences in industrial composition and differences in trend employment growth explain most of the regional variation in manufacturing employment growth during the Great Depression. See Heim (1998) for a survey and discussion of differences in economic performance across industries, regions and nations during the Great Depression.

[2] See Wheelock (1995) and Rucker and Alston (1987) on interstate differences in bank failure and farm failure rates, respectively.

[3] Annual estimates of state per capita incomes for 1929-39 were produced in the 1950s by Schwartz and Graham (1956) using various industrial censuses and other sources of data for specific industries and income components. In the absence of consistent annual state-level data on income components, Schwartz and Graham (1956) resorted to interpolation between census benchmark years. Thus, annual variation in personal income estimates across states reflects variation in both benchmark year income levels and in the related series, such as employment, used to derive annual estimates of the various components of state income. We have no reason to believe that the annual income estimates fail to convey accurately the true variation across states in personal income growth during the 1930s, but these estimates are undoubtedly not as reliable as estimates for more recent years. Appendix 1 summarizes Schwartz and Graham's (1956) construction of state personal income estimates. We use a slightly revised version of the original estimates available from the U.S. Department of Commerce, Bureau of Economic Analysis: "State Personal Income 1929-99 CD-ROM."

[4] See Crain and Lee (1999) for a survey of this literature and new empirical evidence.

contends that bank failures and other financial disruptions also increased the cost of credit intermediation. He finds that bank failures had a significant impact on aggregate output apart from their impact on the money stock.[5] Bank failure rates varied widely across states during the Great Depression, and we examine whether these differences contributed significantly to differences in state economic performance.[6]

In contrast to monetary and credit forces, the macroeconomics literature has concluded that government fiscal policies had little to do with the Great Depression. Federal income tax hikes in 1932 and later years were perverse, but as a percentage of gross domestic product (about 3.5 percent), Federal Government receipts were low and changed little during 1929-33. The Federal deficit did increase somewhat between 1934 and 1940, but Romer (1992) concludes that fiscal policy contributed "almost nothing" to recovery from the Depression. Her estimates of fiscal and monetary policy multipliers suggest that a much larger increase in the deficit would have been required to have had much impact on aggregate spending.[7]

Although the stance of fiscal policy under President Roosevelt was not strongly expansionary, New Deal programs did distribute large sums of money to state and local governments for public works, payments to farmers, and other forms of relief. Researchers have sought to estimate the impact of New Deal jobs programs on employment (e.g., Fleck, 1999) and New Deal spending on local economic activity. Fishback, Horrace and Kantor (2004), for example, investigate whether New Deal

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[5] The literature on the role of monetary forces in the Great Depression is enormous, with important contributions from Friedman and Schwartz (1963), Temin (1976), Eichengreen (1992), Romer (1992), and others. The role of credit and other financial frictions in the Depression is examined by Bernanke (1983), Anari, Kolari, and Mason (2003), and others, and is surveyed by Calomiris (1993).

[6] Several studies conclude that differences in banking conditions and regulation have contributed significantly to differences in state income growth since 1970. For example, Jayratne and Strahan (1996) find that deregulation of state branch banking laws during the 1970s and 1980s had large and lasting effect on state per capita income growth rates. Similarly, Samolyk (1994) finds that in financially-distressed regions, local banking-sector conditions can explain a high percentage of state income growth rates during 1983-90.

[7] See also Brown (1956) and Peppers (1973).

spending affected retail sales at the county-level. They estimate that retail sales increased by about 44 cents for each additional dollar of public works and relief spending in a county. By contrast, county-level retail sales declined with increased payments to farmers under Agricultural Adjustment Act programs. We follow the approach of Fishback, Horrace and Kantor (2004) to investigate whether New Deal spending patterns help explain differences in state per capita income growth rates during the recovery phase of the Great Depression.

The following section describes patterns in state per capita income growth during the contraction and recovery phases of the Great Depression. Section III discusses hypotheses about why per capita income growth rates differed across states during the Depression. Section IV describes our estimation methods. Section V presents estimation results, and Section VI concludes.

II. Patterns in State Per Capita Income Growth, 1929-1939

Table 1 lists states in order of their percentage decline in nominal per capita income during 1929-32.[8] It also lists the level of state per capita income in 1929 and the percentage increase in per capita income during 1933-39. Massachusetts had the smallest decline in per capita income during 1929-32 at 32 percent, while North and South Dakota had the largest declines, both 56 percent. In general, states with smaller per capita income in 1929 tended to suffer larger percentage declines in income during 1929-32. States with relatively high income per capita in 1929, e.g., New York, California and Connecticut, by contrast, experienced relatively small income declines. This pattern was

[8] We focus on changes in nominal income rather than real (constant-dollar) income throughout this study because of a lack of aggregate price data for individual states. The National Bureau of Economic Research dates the business cycle peak in the third quarter of 1929, and the trough in the first quarter of 1933. Hence, using annual data, we consider 1929-32 to be the contraction phase of the cycle and 1933-39 to be the expansion phase.

reversed during the recovery phase, when low income states tended to have larger percentage income gains than high income states.

The divergence of state per capita incomes during 1929-32 was at odds with the long-run tendency of state per capita incomes to converge. Between 1880 and 1980, the standard deviation of the log of per capita personal income fell from 0.54 to 0.15. Over this one hundred year period, state per capita incomes converged at an average rate of about 2 percent per year, according to Barro and Sala-i-Martin (2004), and convergence occurred in nearly every decade.[9] The decade of the 1920s was an exception, suggesting that the forces causing divergence in per capita incomes during the contraction phase of the Great Depression may have been in place during the prior decade.

Regional patterns in per capita income growth during the contraction and recovery phases of the Great Depression are evident in Figures 1 and 2. In general, states experienced growth rates that were similar to their immediate neighbors. During the contraction, agricultural states in the Midwest, Great Plains and South Central regions tended to have large percentage declines in state per capita incomes, while states along the Atlantic Coast tended to have relatively small percentage declines. During the recovery, states in the upper Midwest and Plains tended to have large percentage income gains, while states in the Northeast generally had smaller increases.

III. Hypotheses

We investigate the sources of state per capita income growth during the contraction and recovery phases of the Great Depression. We test hypotheses motivated by leading macroeconomic explanations of the Great Depression and studies of differences in state per capita income growth since World War II. We begin with the

[9] Barro and Sala-i-Martin (2004) distinguish between "σ" and "β" convergence, with the former referring to a decline in the standard deviation of per capita income across states, and the latter referring to the speed of convergence as estimated by the coefficient estimate on initial period per capita income in a regression of the percentage change in per capita income on initial income and perhaps other variables.

basic empirical model of Barro and Sala-i-Martin (2004), which estimates the speed at which the per capita incomes of states or regions converge by regressing the percentage change in per capita income on per capita income in the initial period and a limited number of control variables. We augment the Barro and Sala-i-Martin (2004) model to test hypotheses that are specific to the Depression, including the effects of bank failures and government spending.

That states within the same region often have similar per capita income growth rates is not surprising. Neighboring states tend to have similar climate, geography, settlement patterns, etc., that lead to concentration in the same income-producing sectors. Hence, neighboring states may experience similar changes in per capita income because they have the same leading economic sectors. A sector-specific shock, e.g., a large decline in agricultural prices, will have a larger impact on states with dominant agricultural sectors, which tend to be located near one another, than on states which derive relatively little income from agriculture. Hence, sector-specific shocks can give rise to regional patterns in income growth.

Other types of shocks can produce regional patterns in state income growth that are unrelated to concentration in specific income-producing sectors. Obviously, a war or a natural disaster can affect income growth regardless of source, and thereby introduce similarities in state income growth within regions that are unrelated to industrial concentration. In our econometric model of state per capita income growth we include both a measure of concentration in specific income-producing sectors and regional dummies as explanatory variables.

To capture the impact of aggregate shocks that affect groups of states differently, depending on the concentration of state economic activity in particular sectors, we

include a variable used by Barro and Sala-i-Martin (2004) in their income growth regressions:

$$S_{it} = \sum_{j=1}^{9} \omega_{ij,t-T} \bullet \left[\log(y_{jt} / y_{j,t-T}) / T \right] \qquad (1)$$

where ($\omega_{ij,t-T}$) is the ratio of earnings (income) in sector *j* to total earnings in state *i* at time *t-T*, and y_{jt} is the national average of personal income per worker in sector *j* at time *t*. A state will have a larger value of *S* the more its income is derived from sectors that are experiencing rapid income growth nationally. Barro and Sala-i-Martin (2004) find that *S* can account for the divergence of state per capita incomes during the 1920s. We include *S* to investigate the extent to which aggregate shocks to particular sectors explain differences in state per capita income growth rates during the Depression.

Whereas our industry structure variable, *S*, and regional dummies control for aspects of state income growth associated with aggregate shocks and location, we also explore whether a state's income growth was influenced by income growth in neighboring states. A decline in per capita income in one state may have a negative effect on the per capita incomes of neighboring states because of commuting patterns, trade flows, etc. Just as one corrects for autocorrelation in time series data, consistent and efficient estimation of cross-sectional data requires testing and possibly correcting for spatial correlation (Anselin, 1988). Our models allow for the possibility of spillovers (spatial dependence) in per capita income growth, and, in some specifications, for unobserved spatial dependence present in the error structure.[10]

Monetary and financial forces play a major role in many macroeconomic explanations of the Great Depression. For example, Friedman and Schwartz (1963, p. 300) write that the contraction was a "tragic testimonial to the importance of monetary

[10] Observed and unobserved spatial dependence have been found in the cases of state budgets and expenditures (Case, et al., 1993), county lottery sales (Garrett and Marsh, 2002), state tax policy (Hernandez, 2003), and agricultural production (Marsh, et al., 2000).

forces." In their view, the Great Depression was caused by a collapse of the money stock which in turn was caused by banking panics and errant Federal Reserve policy. Focusing on the recovery phase, Romer (1992, p. 757) argues similarly: "Nearly all of the observed recovery of the U.S. economy prior to 1942 was due to monetary expansion."

Whereas Friedman and Schwartz (1963) focus on the impact of banking panics on the money stock, Bernanke (1983) contends that bank failures also depressed economic activity by disrupting credit flows. Bank failures sever lending relationships and thereby increase the cost of intermediation. Bernanke (1983) reports regression evidence that during the Great Depression bank failures exerted a significant independent influence on aggregate U.S. output growth apart from the effect of changes in the money stock.

We investigate whether differences in the extent of banking distress contributed to differences in the growth of state per capita incomes. A federal prohibition on interstate branch banking and restrictions on branching within many states left the banking systems of most states populated by large numbers of small, undiversified banks. The fortunes of such banks were closely tied to income growth in their home market. Sharp declines in commodity prices and agricultural incomes wiped out hundreds of small farming community banks in the 1920s (Alston, Grove and Wheelock, 1994). Further declines probably caused many bank failures in the Great Depression, as stressed by Temin (1976) and others who contend that bank failures were largely a result of, rather than a cause of, the Depression.

The incidence of bank failures varied widely across the United States during the Depression. Rhode Island had no bank failures between 1929 and 1932, and Maine (0.50 percent), Vermont (0.60 percent), and New Hampshire (0.60 percent) all had low average

failure rates.[11] At the other extreme, Nevada had an average failure rate of 16.5 percent, though most of its failures were associated with the collapse of a single banking chain in late 1932 (Doti and Schweikart, 1991, pp. 115-23). Other states with high failure rates included South Carolina (15.5 percent), Florida (14.9 percent), and Arkansas (14.8 percent).

Bank failure rates typically were higher in states that experienced larger declines in per capita income. The correlation between the percentage change in state per capita income and the average annual bank failure rate during 1929-32 is –0.39. Falling borrower income increases the likelihood of default and ultimately of bank failure. However, as stressed by Friedman and Schwartz (1963) and Bernanke (1983), bank failures might themselves depress economic activity through the destruction of deposits and lending relationships. Wicker (1996) finds that banking panics in 1930 and 1931 reduced private expenditures in the cities where failures were concentrated, though he finds little evidence of direct impacts elsewhere. We test whether differences in bank failure rates contributed to differences in per capita income growth during the Depression, but use an instrumental variables approach to take account of the two-way causality between failures and income.

Finally, we investigate whether state government expenditures affected the growth of per capita income during the Great Depression. Crain and Lee (1999) study state income growth during the period 1977 to 1992. During this period, Crain and Lee (1999) find that an increase in state expenditures relative to state personal income reduced per capita income growth. We test whether the growth of state per capita income was similarly affected during the Depression. Conceivably, a high level of state

[11] We report the annual average failure rate, which is the ratio of banks suspended within a year to the number of operating banks at the beginning of the year.

government expenditures might cushion the effects of falling private expenditures on per capita income. The influence of state government expenditures on income growth in this period is especially interesting given the large increases in state tax rates, tax bases, and expenditures that occurred during the 1930s relative to earlier decades.[12]

Our empirical investigation of the contraction phase of the Great Depression focuses on the effects of sector concentration, spatial patterns, banking distress and state government expenditures on the growth of state per capita income. For our study of the recovery phase, we also consider the impact of Federal Government expenditures. Brown (1956) and Peppers (1973) argued that Federal Government fiscal policy, as reflected by the high-employment budget deficit, was not significantly expansionary during the recovery period. Romer (1992) also concludes that fiscal policy had little to do with the recovery.

A recent study by Fishback, Horrace and Kantor (2004) finds, however, that New Deal expenditures had a significant impact on private spending at the county level. Fishback, Horrace and Kantor (2004) regress county-level retail sales growth on per capita public works and relief spending, per capita spending under the Agricultural Adjustment Act (AAA), state fixed effects, and a variety of control variables. They use an instrumental variables model to control for the possibility that New Deal spending was targeted toward economically-distressed counties. The study finds that spending on public works and relief increased retail sales, whereas AAA spending had an ambiguous effect.[13]

We take a similar approach to investigate the impact of New Deal expenditures on the growth of state per capita incomes during 1933-39. Like Fishback, Horrace and

[12] See Advisory Commission on Intergovernmental Relations (1995).
[13] Fleck (1999) uses a similar approach to study the effects of New Deal work-relief hiring programs on county-level unemployment rates.

Kantor (2004), we use an instrumental variables approach to control for the extent to which New Deal spending targeted states that had experienced especially large declines in income.

IV. Estimation Methodology

We estimate the percentage change in state per capita incomes during the contraction and recovery phases of the Great Depression separately. Our model is similar to that of Barro and Sala-i-Martin (2004). For the contraction phase, we regress the change in per capita income on the level of per capita income in 1929, Barro and Sala-i-Martin's (2004) industry concentration variable (*S*), four regional dummy variables, a measure of bank failure, and the ratio of state government expenditures to state income in 1929.[14] In addition, we test for spatial relationships in per capita income growth between states.

Our bank failure variable is the annual average rate of bank suspensions during 1929 to 1932.[15] We use an instrumental variables approach to control for the impact of declining state incomes on bank failure rates. The variables used to instrument for bank suspensions are shown in the top portion of Table 2, and reflect aspects of banking market structure and regulation that have been used to explain interstate differences in bank failure rates during the 1920s and 1930s (Wheelock, 1993; 1995). These include a measure of average bank size in 1929 (Deposits per Bank, 1929), the number of national

[14] The states included in each of the four regions are: Northeast – NH, PA, MA, ME, NY, VT, CT, RI; South – FL, MS, GA, NC, AL, TN, TX, VA, AR, WV, MD, KY, LA, OK, DE, SC; Midwest – MI, ND, SD, MO, WI, IL, NE, OH, MN, IA, KS, IN; West (omitted) – CO, MT, CA, NM, UT, WA, OR, NJ, NV, AZ, ID, WY. Our industry concentration variable (*S*) is calculated using earnings from the following ten industries: Farm, Agriculture Services, Mining, Construction, Manufacturing, Transportation & Public Utilities, Wholesale & Retail Trade, Finance & Insurance & Real Estate, Services, and Government.

[15] Bank suspensions are defined as banks closed on account of financial difficulty. Suspended banks are not necessarily closed and liquidated by bank regulators, as discussed by Anari, Kolari, and Mason (2003). Data on the closure and liquidation of state-chartered banks are not available, however, and most studies use suspension data. We also considered the average ratio of deposits in suspended banks to deposits in all operating banks as a measure of bank failure. The correlation between this variable and the bank suspension variable is 0.853, and including the ratio of deposits in suspended banks instead of bank suspensions produced nearly identical regression results.

banks divided by the number of all commercial banks within a state (Percent National Banks, 1929), the percentage of a state's bank deposits held in national banks (Percent Deposits in National Banks, 1929), the minimum capital requirement imposed on state banks (Minimum Capital, 1929), and the percentage of the state population living in rural areas (Percent Rural Population).[16]

For the recovery years 1933-39, we regress the percentage change in state per capita income on New Deal spending, industry structure (*S*), per capita income in 1933, the ratio of state expenditures to state personal income in 1932, and four regional dummy variables.[17] We use income data from 1933 and 1939, rather than 1929 and 1932, in constructing the industry structure variable for the expansion phase. As in the contraction phase regressions, the expansion phase regressions also account for spatial effects. The New Deal spending variable is the annual average of per capita New Deal spending (loans plus grants) over the period 1933 to 1939.[18]

Economic historians have sought to explain the distribution of New Deal expenditures across states. Several studies have noted a *positive* correlation between a state's per capita income and the amount it received in Federal Government expenditures under the New Deal. Wright (1973) found little evidence that either low income or high unemployment affected the amount of New Deal spending a state received, and that instead a measure of "political productivity" could explain a high percentage of the allocation of Federal expenditures across states. Later studies, surveyed and extended by

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[16] We also included the independent variables listed at the top of Table 2 in the first stage regression. Hausman tests reveal mixed evidence of simultaneity between bank failures and the change in per capita income, depending on specification. To be conservative, we instrument for bank suspensions in all specifications presented in the paper, though our results are qualitatively similar if the bank suspension rate is not instrumented. The Hausman test results are available upon request.

[17] State expenditure data are not available for 1933. We included the average bank suspension rate for 1929-32 as an explanatory variable in a preliminary regression for 1933-39 to test whether income growth during the recovery was affected by banking distress during the contraction. This variable was insignificant in all expansion phase regressions, however, and we elected to not include it in our final results.

[18] We thank Price Fishback for providing these data.

Wallis (1998; 2001) and Fleck (2001), found that both political and economic considerations were important determinants of New Deal spending patterns. Using county-level data on expenditures, Fishback, Kantor and Wallis (2003) also find that while political considerations were important, the major New Deal relief programs were responsive to the goals of relief, recovery and economic reform.

In testing whether Federal Government spending affected state per capita income growth during the recovery phase of the Great Depression, we use instrumental variables to control for the possibility that New Deal spending was to some extent influenced by income growth. In doing so, we follow Fishback, Horrace and Kantor (2004), who investigate the impacts of New Deal expenditures on economic activity at the county level. Our instruments for New Deal expenditures are similar to those used by Fleck (1999) and Fishback, Horrace, and Kantor (2004), and are listed in the bottom panel of Table 2.[19] They include the average of the Democratic vote share in each presidential election from 1896 to 1932 (Percent of Democratic Votes), the standard deviation of the Democratic vote share from 1896 to 1932 (Standard Deviation of Democratic Votes), average voter participation in each presidential election from 1896 to 1932 (Voter Participation), Federal land as a percent of a state's total land area in 1930 (Percent Federal Land), and the percent of a state's population that belonged to a church in 1926 (Percent Church Membership).[20] Descriptive statistics for all variables used in the analysis are shown in Table 2.

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[19] Hausman tests for simultaneity between per capita income growth and per capita New Deal spending were mixed, depending upon specification. To be conservative, we follow Fishback, Horrace and Kantor (2004) and instrument for New Deal spending in all specifications presented in the paper. We initially included a dummy variable for Nevada in the first stage regression of New Deal spending because spending per capita in Nevada was about $50 higher than in any other state. While the coefficient on this variable was positive and significant, neither the fitted value for New Deal spending nor the second stage results were affected significantly by the inclusion of the dummy. Hence, we did not include the dummy in obtaining our final results.

[20] Voting data are from the U.S Census *Historical Statistics of the United States, Colonial Times to 1970*, church membership data are from the U.S. Census *Religious Bodies*, 1926, and Federal land information is

We estimate the following model separately for the contraction phase and expansion phase of the Great Depression:

$$y = \alpha + X\beta + \rho \bullet Wy + \varepsilon \qquad (2)$$

where y is the percentage change in per capita personal income and X is the matrix of independent variables listed in Table 2 (state subscripts i are suppressed). Spatial correlation in the dependent variable (termed a 'spatial lag') is captured by the coefficient ρ, under the hypothesis that a change in per capita income in state i is correlated with changes in per capita income in neighboring states. Ignoring spatial correlation in the dependent variable, if present, can result in inconsistent coefficient estimates (Anselin, 1988). The (NxN) spatial weights matrix, W, is specified to capture the effect of a change in per capita income in state i that results from a change in per capita income in bordering state l. Specifically, the elements of our weights matrix $W = \{w_{il}^*\}$ are defined as $w_{il}^* = w_{il} / \sum_l w_{il}$ where $w_{il} = 1$ if observations i and l ($i \neq l$) share a common border and $w_{il} = 0$ otherwise (Cliff and Ord, 1981; Anselin 1988). Because the spatially lagged dependent variable is endogenous by construction, we instrument this variable along with the bank suspension and New Deal spending variables. We follow the literature and use spatially lagged independent variables (WX) as instruments for the spatially lagged dependent variable (Kelejian and Prucha, 1998, 1999; Hernandez, 2003).

We also model spatial dependence in the error structure of Equation 2. Spatial error correlation can result from spatial heterogeneity and spatially lagged independent variables, and a failure to account for spatial error correlation can result in inefficient coefficient estimates (Anselin, 1988). The first-order spatial autoregressive structure is given as:

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from the Annual Report of the Commissioner of the General Land Office to the Secretary of the Interior, 1930 and the Committee on the Conservation and Administration of the Public Domain, 1931.

$$\varepsilon = \lambda W \varepsilon + \upsilon = (I - \lambda W)^{-1} \upsilon \qquad (3)$$

where ε is the (Nx1) vector of error terms, υ is a (Nx1) component of the error terms made up of i.i.d. random variables, W is the (NxN) weights matrix with elements $W = \{w_{il}^{*}\}$ defined earlier, and λ is a scalar interpreted as the unobserved spatial error correlation coefficient.[21]

We estimate our models using the methodology of Kelejian and Prucha (1999). The methodology is generalized 2SLS where the spatial error coefficient, λ, is estimated via the generalized method of moments (GMM). A generalized 2SLS procedure produces consistent estimates of the model's parameters (Kelejian and Prucha, 1999).

The estimation procedure has several steps. First, we obtain fitted values for all endogenous variables in the system by regressing each variable on the full set of independent variables and instruments for their respective era (see Table 2). The instrumented variables are bank suspensions and *Wy* for the period 1929-32, and New Deal spending and *Wy* for the period 1933-39. The fitted values are then used in Equation 2, which is estimated via OLS. For the specifications in which we consider a spatial error lag, we obtain the 2SLS residuals and calculate $\hat{\lambda}$ using the GMM procedure outlined in Kelejian and Prucha (1999). Equation 2 is then pre-multiplied by $(I - \hat{\lambda} W)$ and this transformed equation is estimated by 2SLS.

V. Empirical Results

Contraction Phase 1929-1932

Table 3 reports the 2SLS regression estimates for the contraction period 1929-32. The first-stage regression results and several alternative OLS estimates are shown in

[21] Unlike the autoregressive parameter in a time series model, the spatial parameters ρ and λ do not necessarily lie between -1 and 1. A search for values of ρ and λ is typically conducted over the interval of the reciprocal of the smallest eigenvalue of the weights matrix and the reciprocal of the largest eigenvalue of the weights matrix. See Anselin (1988).

Appendix 2. We report three sets of specifications, with Models 1 and 2 including no spatial effects, Models 3 and 4 including a spatial lag (with coefficient estimate ρ), and Models 5 and 6 including both a spatial lag and a spatial error term (with estimate λ). Each pair of models includes one specification with three regional dummy variables (the West region is subsumed in the intercept).

For the contraction phase of the Great Depression, 1929-32, we find a statistically significant impact of industry structure on state per capita income growth. States that were highly concentrated economically in sectors that performed especially poorly during 1929-32, such as construction, farming, and mining, had significantly larger declines in income than did more diversified states. States that were concentrated in sectors that performed relatively less badly, such as services, finance and transportation, also had smaller income declines. Rosenbloom and Sundstrom (1999) found similar results in their study of state-level differences in manufacturing employment during the Depression.

In addition to aggregate income shocks, our results also indicate spatial dependence and regional effects on state per capita income growth rates. Model 2 includes regional dummy variables, and our estimates suggest that states located in the Northeast had significantly higher state per capita income growth rates even after differences in industry structure, bank failure rates, and other variables are controlled for. Models 3 and 4 include a spatial lag term, ρ, which is statistically significant in Model 3, but not statistically significant when regional dummies are included in Model 4. As a group, however, the regional dummies fail to add statistically significant explanatory power in Model 4, as indicated by the likelihood ratio test statistic of 2.878. Finally, Models 5 and 6 include a spatial error term, λ, as well as a spatial lag. Likelihood ratio

tests fail to reject the null hypothesis that λ=0 in either model. The spatial lag term (ρ) is positive and significant in both specifications, however, indicating positive per capita income growth spillovers from neighboring states. The spatial lag coefficient reveals that the average state's change in per capita personal income fell about 0.5 percentage points for a 1 percentage point fall in the growth rate of per capita personal income in neighboring (border) states.

We find little evidence that differences in bank failure rates or in the ratio of state government expenditures to state income explain variation in per capita income growth rates during the contraction. Although the coefficient on the average percentage of banks suspended is statistically significant in Model 1, the coefficient is not significant in specifications that include regional dummy variables or spatial effects. We obtained similar results when we replaced the percentage of suspended banks with the average ratio of deposits in suspended banks to deposits in active banks.[22]

In sum, we find evidence in support of the hypothesis that differences in industrial composition contributed to variation in per capita income growth rates across states during the contraction phase of the Great Depression. The greater the extent to which a state's income was derived from sectors that performed especially poorly, the larger the state's decline in per capita income. We find evidence that state income growth was also influenced by the income growth of its neighbors. Further, our results indicate that industry structure and spatial effects can account for divergence in the level of state per capita incomes during 1929-32. When these variables are included in the model, the coefficient on the 1929 level of per capita income is negative (and statistically significant

[22] We also obtained similar results when we treated bank failures in Florida and Nevada separately from those in other states. Both states were outliers in the sense of having high average bank failure rates compared to their declines in state income. Florida experienced a wave of failures in 1929 at the tail end of a banking crisis that began in 1926 (see Vickers, 1994), while the bulk of Nevada's failures occurred in late 1932.

in Model 5). Hence, industry structure and spatial effects can fully explain the *positive* correlation between the 1929 level of state per capita income and income growth during 1929-32. Finally, we find that differences in bank failure rates and state government expenditures explain little of the variation in state per capita income growth during 1929-32.[23]

Recovery Phase 1933-1939

Our 2SLS results for the recovery phase of the Great Depression are shown in Table 4. The first-stage regression results and several alternative OLS estimates are shown in Appendix 2. During the recovery phase, state per capita income growth rates were higher in states that had lower income levels in 1933 and larger declines in per capita income during 1929-32. For 1933-39, we find that both regional and spatial effects help explain differences in state per capita income growth rates. As during the contraction phase, we find that a state's per capita income growth was influenced positively by income growth in neighboring states. The spatial lag coefficients indicate that a state's per capita income growth rate increased by an average of 0.53–0.59 percentage points in response to a 1 percentage point increase in the growth rate of per capita income in bordering states.

Unlike the contraction phase, we find no evidence that industrial composition affected state per capita income growth during the recovery. In contrast to 1929-32, when the construction and manufacturing sectors experienced considerably larger declines in income than other sectors, there was less variation in income growth across sectors during 1933-39. Hence, differences across states in per capita income growth

[23] Our results do not necessarily indicate that bank failures were unimportant for aggregate U.S. income growth. For example, as Friedman and Schwartz (1963) argue, the decline in the money stock and national income could have been caused by banking panics, rather than failures *per se*.

rates were influenced little by differences in the extent to which state incomes were derived from specific sectors.

By contrast, we find that differences in New Deal spending levels can help explain differences in state per capita income growth rates. The higher the level of Federal expenditures and loans within a state, all else equal, the higher the state's per capita income growth rate. The estimated effect is statistically significant in our baseline specification that includes no spatial effects, as well as in the specifications that control for spatial effects and include regional dummy variables (Models 4 and 6). In addition, the estimated coefficient is relatively stable across specifications. Using the average of the New Deal spending coefficient estimates across the six specifications (0.00355), we calculate that a $1 increase in New Deal spending per capita within a state would result in a 0.355 percentage point increase in per capita income growth. Or, a $27.19 (one standard deviation) increase in New Deal spending within a state would result in a 9.7 percentage point increase in per capita income growth.[24] Our results are thus consistent with Fishback, Horrace and Kantor (2004), who find that New Deal expenditures had a positive impact on county-level retail sales.[25]

VI. Conclusion

Per capita income fell substantially in all U.S. states during the contraction phase of the Great Depression. However, the extent to which per capita income declined varied widely across states. States that had relatively low per capita incomes on the eve of the Depression tended to suffer larger percentage declines in per capita income than high-income states. We find that much of this divergence in per capita income was due to the

[24] The standard deviation of the fitted New Deal expenditure variable ($27.19) is used rather than the standard deviation of the actual New Deal expenditure variable ($30.68). Annual New Deal expenditures averaged 14.72 percent of state personal income during 1933-39.

[25] Our empirical results are qualitatively the same and quantitatively similar to those reported here if we omit spending under the Agricultural Adjustment Act from our measure of New Deal expenditures, or if we redefine our measure as expenditures alone, rather than as expenditures plus loans.

concentration of low income states in sectors such as agriculture, mining and construction that suffered disproportionately large income declines at the national level. Further, we find evidence of significant spatial effects in that the decline in one state's per capita income was larger, the greater the decline among its immediate neighbors. Indeed, industrial composition and spatial effects can fully explain why states with low initial income suffered larger declines in income during the contraction.

State per capita incomes converged during the recovery phase of the Great Depression. In contrast to the contraction phase, differences in industrial composition and cross-state income spillovers explain little or no variation in per capita income growth across states during the recovery. We find evidence that New Deal expenditures had a rather large and statistically significant effect on state per capita income growth. However, considerable regional variation in state per capita income growth during the recovery remains unexplained.

References

Abrams, Burton A., Clarke, Margaret Z., and Russell F. Settle. "The Impact of Banking and Fiscal Policies on State-Level Economic Growth." *Southern Economic Journal* 66(2), October 1999, pp. 367-78.

Advisory Commission on Intergovernmental Relations. *Significant Features of Fiscal Federalism*, Washington, D.C., 1995.

Alston, Lee J., Grove, Wayne A., and David C. Wheelock. "Why Do Banks Fail? Evidence from the 1920s." *Explorations in Economic History* 31, 1994, pp. 409-31.

Anari, Ali, Kolari, James, and Joseph Mason. "Bank Asset Liquidation and the Propagation of the Great Depression." Working paper, May 2003.

Anselin, Luc. *Spatial Econometrics: Methods and Models*. Kluwer Academic Publishers: Dordrecht, 1988.

Bernanke, Ben S. "Nonmonetary Effects of the Banking Crisis in the Propagation of the Great Depression." *American Economic Review* 73(3), June 1983, pp. 257-76.

Brown, E. Cary. "Fiscal Policy in the 1930s: A Reappraisal." *American Economic Review* 46, December 1956, pp. 857-79.

Calomiris, Charles W. "Financial Factors in the Great Depression." *Journal of Economic Perspectives* 7(2), Spring 1993, pp. 61-85.

Case, Anne; Harvey Rosen; and James Hines Jr. "Budget Spillovers and Fiscal Policy Interdependence: Evidence from the States." *Journal of Public Economics*, 52(3), October (1993): 285-307.

Cliff, A. and J. Ord. In: *Spatial Processes, Models, and Applications*: Pion: London, 1981.

Crain, Mark and Katherine Lee. "Economic Growth Regressions for the American States: A Sensitivity Analysis." *Economic Inquiry,* vol. 37, no. 2 (April 1999): 242-257.

Doti, Lynne Pierson, and Larry Schweikart. *Banking in the American West: From the Gold Rush to Deregulation*. Norman: University of Oklahoma Press, 1991.

Eichengreen, Barry. *Golden Fetters: The Gold Standard and the Great Depression, 1919-1939*. New York: Oxford University Press, 1992.

Fishback, Price V., Horrace, William C., and Shawn Kantor. "Did New Deal Grant Programs Stimulate Local Economies? A Study of Federal Grants and Retail Sales During the Great Depression." Working paper, March 2004 (forthcoming in the *Journal of Economic History*).

Fishback, Price V., Kantor, Shawn, and John Joseph Wallis. "Can the New Deal's three Rs be Rehabilitated? A Program-by-Program, County-by-County Analysis." *Explorations in Economic History* 40(3), July 2003, pp. 278-307.

Fleck, Robert K. "The Marginal Effect of New Deal Relief Work on County-Level Unemployment Statistics." *Journal of Economic History* 59(3), September 1999, pp. 659-87.

Freeman, Donald G. "Did State Bank Branching Deregulation Produce Large Effects?" *Economics Letters* 73(5), May 2002, pp. 383-89.

Friedman, Milton, and Anna J. Schwartz. *A Monetary History of the United States, 1867-1963*. Princeton: Princeton University Press, 1963.

Garrett, Thomas A. and Thomas L. Marsh. "The Revenue Impacts of Cross-Border Lottery Shopping in the Presence of Spatial Autocorrelation." *Regional Science and Urban Economics*, 32(4), July 2002: 501-19.

Heim, Carol E. "Uneven Impacts of the Great Depression: Industries, Regions, and Nations," in Mark Wheeler, ed. *The Economics of the Great Depression*. Kalamazoo: The Upjohn Institute, 1998, pp. 29-61.

Hernandez, Ruben. "Strategic Interaction in Tax Policies Among States." *Federal Reserve Bank of St. Louis Review*, 85(3), May/June 2003: 47-56

Jayaratne, Jith and Strahan, Philip E. "The Finance-Growth Nexus: Evidence from Bank Branch Deregulation." *Quarterly Journal of Economics* 111(3), August 1996, pp. 639-70.

Kelejian, H. and I. Prucha. "A Generalized Spatial Two-Stage Least Squares Procedure for Estimating a Spatial Autoregressive Model." *Journal of Real Estate Finance and Economics*, 17 (1998): 99-121.

Kelejian, H. and I. Prucha. "A Generalized Moments Estimator For the Autoregressive Parameter in a Spatial Model." *International Economics Review*, vol. 40, no. 2 (May 1999): 509-533.

Marsh, Thomas L.; Ron C. Mittlehammer; and Ray G. Huffaker. "Probit with Spatial Correlation by Field Plot: Potato Leafroll Virus Net Necrosis in Potatoes." *Journal of Agricultural, Biological, and Environmental Statistics*, 5(1), 2000, 22-36.

Peppers, L. "Full Employment Surplus Analysis and Structural Change: The 1930s." *Explorations in Economic History* 10(2), Winter 1973, pp. 197-210.

Rosenbloom, Joshua L. and Sundstrom, William A., "The Sources of Regional Variation in the Severity of the Great Depression: Evidence from U.S. Manufacturing, 1919-1937." *Journal of Economic History* 59(3), September 1999, pp. 714-47.

Romer, Christina D. "What Ended the Great Depression?" *Journal of Economic History* 52(4), December 1992, pp. 757-84.

Rucker, Randal R. and Lee J. Alston. "Farm Failures and Government Intervention: A Case Study of the 1930s." *American Economic Review* 77(4), September 1987, pp. 724-30.

Samolyk, Katherine A. "Banking Conditions and Regional Economic Performance: Evidence of a Regional Credit Channel." *Journal of Monetary Economics* 34, 1994, pp. 259-78.

Schwartz, Charles F., and Robert E. Graham. "Personal Income By States Since 1929." *A Supplement to the Survey of Current Business*, U.S. Department of Commerce. Washington, D.C.: U.S. Government Printing Office, 1956.

Strahan, Philip E. "The Real Effects of U.S. Banking Deregulation." *Federal Reserve Bank of St. Louis Review* 85(4), July/August 2003, pp. 111-28.

Temin, Peter. *Did Monetary Forces Cause the Great Depression?* New York: W. W. Norton, 1976.

Vickers, Raymond B. *Panic in Paradise: Florida's Banking Crash of 1926*. Tuscaloosa: University of Alabama Press, 1994.

Wallis, John Joseph. "Employment in the Great Depression: New Data and Hypotheses," *Explorations in Economic History* 26, 1989, pp. 45-72.

Wheelock, David C. "Regulation, Market Structure, and the Bank Failures of the Great Depression," *Federal Reserve Bank of St. Louis Review* 77(2), March/April 1995, pp. 27-38.

Wheelock, David C. "Government Policy and Banking Market Structure in the 1920s." *Journal of Economic History* 53(4), December 1993, pp. 857-79.

Table 1 – State Per Capita Income Growth 1929-1939

State	Percentage Change in Per Capita Income 1929-1932	Rank: Change in Per Capita Income 1929-1932	Per Capita Income 1929 ($)	Percentage Change in Per Capita Income 1933-1939	Rank: Change in Per Capita Income 1933-1939
South Dakota	-55.63	1	426	167.44	1
Mississippi	-55.59	2	286	56.49	24
North Dakota	-53.93	3	382	118.49	2
Oklahoma	-52.53	4	455	57.21	23
Michigan	-50.13	5	790	80.12	5
Kansas	-50.00	6	532	52.80	27
Alabama	-49.85	7	323	51.81	29
Arkansas	-49.35	8	310	58.60	19
New Mexico	-49.27	9	410	69.19	10
Indiana	-48.23	10	607	76.19	7
Iowa	-48.88	11	581	87.75	4
Illinois	-48.73	12	948	61.10	14
Nebraska	-48.49	13	596	45.45	37
Ohio	-48.12	14	771	59.74	15
Tennessee	-47.62	15	378	52.45	28
Arizona	-46.50	16	600	59.09	18
Kentucky	-46.31	17	393	48.78	35
Wisconsin	-46.21	18	673	54.05	25
Idaho	-46.00	19	507	92.51	3
Washington	-45.75	20	741	63.30	12
Utah	-44.65	21	551	53.69	26
Wyoming	-44.59	22	675	52.88	21
Texas	-44.47	23	479	62.26	13
Colorado	-44.16	24	634	46.18	36
West Virginia	-44.13	25	460	49.81	33
North Carolina	-43.67	26	332	51.44	31
Oregon	-43.26	27	668	59.50	16
Delaware	-42.83	28	1,032	59.40	17
Montana	-42.74	29	592	78.86	6
Vermont	-42.43	30	634	45.27	38
Georgia	-42.36	31	347	51.47	30
Pennsylvania	-41.84	32	772	44.12	39
Louisiana	-41.79	33	414	58.59	20
California	-41.47	34	991	43.01	42
South Carolina	-41.32	35	271	57.71	22
New York	-41.31	36	1,152	31.79	46
Missouri	-41.22	37	621	50.90	32
Connecticut	-39.45	38	1,024	43.40	40
Minnesota	-39.40	39	599	67.86	11
Florida	-38.42	40	518	71.88	9
New Hampshire	-37.76	41	686	34.86	44
Maine	-37.27	42	601	33.42	45
Nevada	-36.64	43	868	73.94	8
New Jersey	-36.06	44	918	43.21	41
Virginia	-34.56	45	434	49.47	34
Rhode Island	-34.21	46	874	28.80	48
Maryland	-33.33	47	768	42.27	43
Massachusetts	-32.34	48	906	29.52	47
MEAN	-44.07		615	59.03	

Source: U.S. Department of Commerce, Bureau of Economic Analysis, "State Personal Income 1929-99 CD-ROM."

Table 2 – Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
Contraction Phase 1929–32				
Percent Change in Per Capita Income	-44.1	5.7	-55.6	-32.3
Independent Variables				
Bank Failure Rate (percent)	6.6	4.5	0.0	16.5
Industry Structure (*S*) – 1929	-0.168	0.010	-0.191	-0.145
Per Capita Income – 1929	615.21	220.94	271.00	1,152.00
State Govt. Share of Income – 1929	0.036	0.016	0.013	0.076
Instruments for Bank Failure Rate				
Deposits Per Bank – 1929	2,089.45	2,787.12	346.67	13,939.17
Percent National Banks – 1929	3.23	1.41	1.01	67.4
Percent Deposits in Nat'l Banks – 1929	47.9	15.6	12.3	81.8
Minimum Bank Capital ($000) – 1929	22.19	14.55	10	100
Percent Rural Population	54.0	19.9	7.6	83.4
Recovery Phase 1933–39				
Percent Change in Per Capita Income	59.0	23.1	28.8	167.4
Independent Variables				
Average Per Capita New Deal Spending	58.30	30.68	28.86	184.70
Industry Structure (*S*) – 1933	0.065	0.001	0.062	0.067
Per Capita Income – 1933	327.96	131.69	129.0	626.0
State Govt. Share of Income – 1932	0.075	0.033	0.028	0.161
Regional Dummy Variables				
Instruments for New Deal Spending				
Percent of Democratic Votes	45.4	15.1	23.3	93.9
Standard Deviation of Democratic Votes	8.6	4.3	2.2	18.3
Voter Participation	59.3	18.8	15.3	83.1
Percent Federal Land	14.4	24.1	0	90.0
Percent Church Membership	42.7	10.7	22.0	72.8

Notes and Sources: Number of observations = 48. *Sources*: Percent Change in Per Capita Income: see Table 1; Bank Failure Rate (number of banks suspended during year divided by number of banks operating at beginning of year): suspensions data are from Board of Governors of the Federal Reserve System, *Banking and Monetary Statistics 1914-1941*, 1943, p. 284. Number of commercial banks is from Board of Governors of the Federal Reserve System, *All Bank Statistics 1896-1955*, 1959. Industry Structure: see text; State Government Share of Income: *Financial Statistics of States*, U.S. Census, 1929 and *Financial Statistics of State and Local Governments* (Wealth, Public Debt, and Taxation), U.S. Census, 1932; Deposits per Bank and Percent National Banks: *All Bank Statistics, 1896-1955*; Minimum Bank Capital: *Polk's Bankers Encyclopedia*, 1929; Percent Rural Population: U.S. Census Bureau, *Urban and Rural Population, 1900 to 1990*; Average per capita New Deal Spending: U.S. Office of Government Reports, Report no. 9, *Direct and Cooperative Loans and Expenditures of the Federal Government, 1933-1939*; Percent Democratic Votes and Voter Participation: *Historical Statistics of the United States, Colonial Times to 1970*, series 135-186; Percent Federal Land: *Annual Report of the Commissioner of the General Land Office*, 1930, and the *Committee on the Conservation and Administration of the Public Domain,* 1931; Percent Church Membership: U.S. Bureau of the Census, *Census of Religious Bodies*, 1926.

Table 3 – Contraction Phase (1929 to 1932) – State Level Results

Dependent Variable: Percent Change in Per Capita Personal Income (1929 – 1932)

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.221*	0.124	0.472***	0.423**	0.637***	0.553**
	(1.85)	(0.98)	(3.55)	(2.20)	(2.78)	(2.51)
Percent of Banks Suspended	-0.380*	0.284	-0.197	-0.163	0.129	-0.126
	(1.77)	(1.01)	(1.08)	(0.84)	(0.49)	(0.57)
Industry Structure – 1929	3.892***	3.561***	4.01***	4.053***	4.760***	4.312***
	(6.02)	(5.10)	(7.40)	(6.37)	(6.92)	(6.57)
Per Capita Income – 1929	0.001	0.001	-0.004	-0.003	-0.009**	-0.007
	(0.08)	(0.35)	(1.11)	(0.86)	(2.14)	(1.59)
State Govt. Share of Income 1929	0.476	-0.085	0.157	0.188	-0.179	-0.050
	(1.09)	(0.17)	(0.41)	(0.45)	(0.44)	(0.12)
Northeast	-------	0.067***	-------	0.031	-------	-0.002
		(3.48)		(1.42)		(0.08)
South	-------	0.014	-------	0.011	-------	-0.006
		(0.089)		(0.81)		(0.32)
Midwest	-------	-0.021	-------	0.003	-------	-0.010
		(1.14)		(0.15)		(0.50)
ρ	-------	-------	0.474***	0.375	0.506*	0.477*
			(2.82)	(1.55)	(1.74)	(1.75)
λ	-------	-------	-------	-------	0.645	0.427
Likelihood Ratio Test $\chi^2_{(3)}$ For Regional Dummy Variables	-------	6.963*	-------	2.878	-------	4.147
Likelihood Ratio Test $\chi^2_{(1)}$ For H_o: $\lambda = 0$	-------	-------	-------	-------	0.853	0.414
Observations	48	48	48	48	48	48

Note: Absolute t-statistics in parentheses. *** denotes significance at 1%, ** at 5%, and * at 10%. The coefficient on per capita income is ultiplied by 1,000. 'West' is the omitted regional dummy variable. First stage regression results are shown in the Appendix.

Table 4 – Expansion Phase (1933 to 1939) – State Level Results

Dependent Variable: Percent Change in Per Capita Personal Income (1933 – 1939)

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Constant	1.718	1.369	0.044	1.377	1.265	1.510
	(1.27)	(1.14)	(0.03)	(1.01)	(0.79)	(1.16)
Average Per Capita New Deal	0.0035***	0.0037**	0.0011	0.0034**	0.0044*	0.0037**
	(3.23)	(2.36)	(0.07)	(2.27)	(1.93)	(2.51)
Industry Structure – 1933	-17.55	-16.72	2.303	-16.64	-17.91	-16.548
	(0.84)	(0.92)	(0.10)	(0.91)	(0.75)	(0.88)
Per Capita Income – 1933	-0.007***	-0.004	-0.0003	-0.0004	-0.010**	-0.0007**
	(2.94)	(1.45)	(1.15)	(1.43)	(2.27)	(2.21)
State Govt. Share of Income 1932	0.584	1.574	1.327	1.694*	0.525	1.258
	(0.54)	(1.50)	(1.19)	(1.69)	(0.43)	(1.27)
Northeast	-------	0.043	-------	0.031	-------	0.021
		(0.44)		(0.32)		(0.18)
South	-------	0.074	-------	0.060	-------	0.049
		(0.75)		(0.66)		(0.53)
Midwest	-------	0.252***	-------	0.245***	-------	0.254**
		(3.46)		(3.25)		(3.06)
ρ	-------	-------	0.587**	0.0065	0.531*	0.023
			(2.04)	(0.03)	(1.76)	(0.08)
λ	-------	-------	-------	-------	0.099	0.160
Likelihood Ratio Test $\chi^2_{(3)}$ For Regional Dummy Variables	-------	14.93***	-------	12.918***	-------	13.560**
Likelihood Ratio Test $\chi^2_{(1)}$ For H_o: $\lambda = 0$	-------	-------	-------	-------	2.560	1.826
Observations	48	48	48	48	48	48

Note: Absolute t-statistics in parentheses. *** denotes significance at 1%, ** at 5%, and * at 10%. The coefficient on per capita income is multiplied by 10. 'West' is the omitted regional dummy variable. First stage regression results are shown in the Appendix.

Figure 1 - Percentage Change in Per Capita Income - Contraction Era (1929-1932)

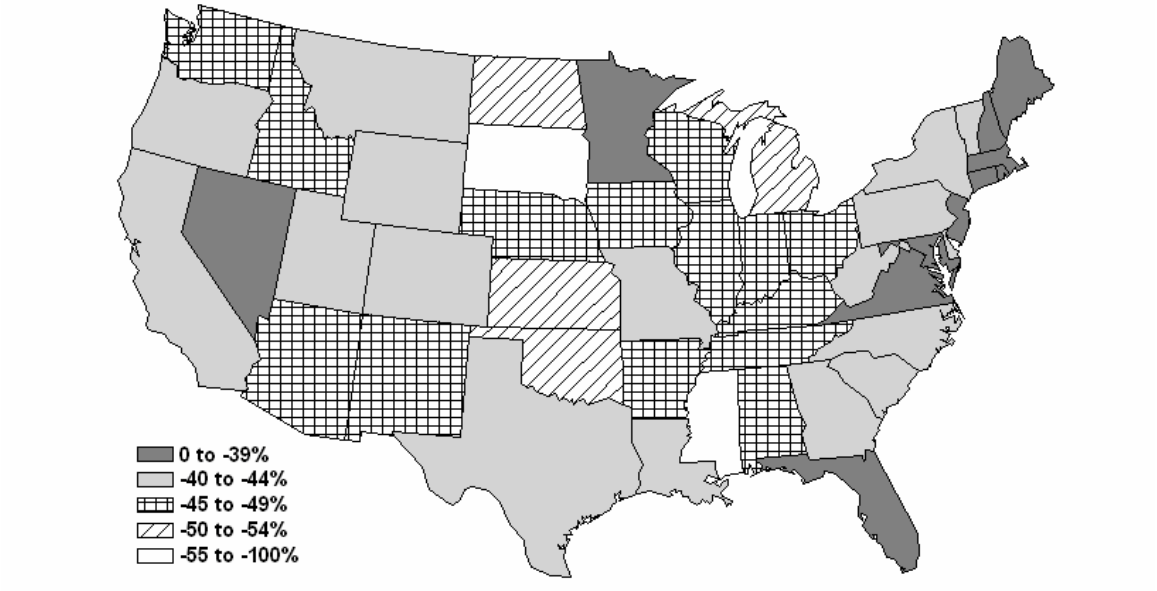
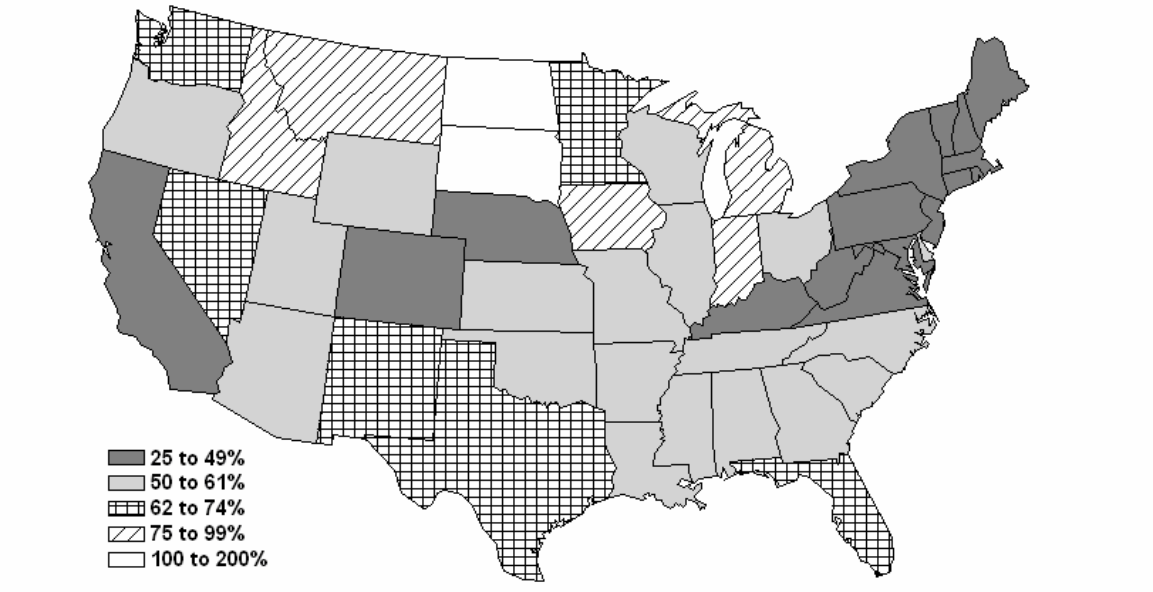


Figure 2 - Percentage Change in Per Capita Income - Expansion Era (1933-1939)



Appendix 1

The source for our data on state per capita income and earnings by sector is "State Personal Income 1929-99 CD-ROM," issued by the U.S. Department of Commerce, Bureau of Economic Analysis. The data for 1929-39 from this source are a slight revision of data published in Schwartz and Graham (1956). This appendix summarizes the description in Schwartz and Graham (1956) of how annual state personal income estimates for 1929-39 were constructed.

Schwartz and Graham (1956) constructed their estimates of state personal incomes from data on individual industries and income components. The major components of income are wages and salaries, proprietors' income, and property income, which together accounted for more than 90 percent of total personal income during the period. The data used to derive estimates of wage and salary income are more comprehensive and complete than those used to estimate proprietors' and property income. Further, among the industrial sources of wage and salary income, data on the manufacturing sector – the largest source – are the most complete. Still, annual estimates are for the most part interpolations of benchmark data, most of which are from censuses.

Data on personal income by sector at the state level include wage and salary disbursements, other labor income (e.g., contributions to pension plans), and proprietors' income. Wage and salary disbursements is by far the largest component, and is the only component with separate estimates by state for each sector. Proprietors' income is divided only between farm and non-farm. Schwartz and Graham (1956) do not explain how they allocated proprietors' income to specific non-farm industries, and report that because an industry breakdown on other labor income is not available from the basic state data, "some special estimation was required" (pp. 54-55).

Specific Information on Derivation of State Personal Income:

1. Wages/Salaries (approximately 60 percent of total personal income): For industries covered by unemployment insurance (UI), state unemployment insurance reports were used to estimate wage/salary payments by industry for 1938-39. Estimates for 1929-37/38 were based mainly on census data, with various annual series used to interpolate between census years as described below.

Cash wages to farm laborers: Agricultural censuses of 1929 and 1939, supplemented by annual surveys by the USDA on employment and wage rates.

Mining: Censuses of 1929, 1935 and 1939; interpolation based on BLS surveys and state reports for other years.

Construction: Censuses of 1929, 1935, and 1939; interpolation based on annual data on the value of construction by states. The estimates for construction are "rather weak" (p. 78).

Manufacturing: This is the largest income-producing sector and "the most reliable component of estimated wage and salary disbursements by states" (p. 78). Schwartz and Graham (1956) first constructed a provisional series using biennial census data and annual survey data. The provisional series was derived as follows: *Wages of production workers* (about two-thirds of total): Data from

biennial censuses of manufacturing (odd numbered years), interpolated using BLS survey data (1932 is the first year that state-level, as opposed to region-level, data are available directly). *Salaries of clerical and administrative employees (one-sixth of total), pay of corporate officers, salaries of central administrative office personnel, and of distribution employees*: Mostly derived from biennial censuses of manufacturing, interpolated with survey data. Information deemed less reliable or complete than data for production workers.

Schwartz and Graham (1956) then adjusted the provisional series for 1929-38 using the relationship between the census-based series and a second series for 1939 derived from unemployment insurance (UI) data. Doing so brought the provisional estimates into "statistical conformity with the UI-based series for the subsequent (i.e., 1939-) period" (p. 79). Schwartz and Graham (1956) do not indicate the extent to which the distribution of wages across states differed between the provisional and final series.

Wholesale and Retail Trade: Based on census data for 1929, 1933, 1935, and 1939. Provisional annual series were derived from annual BLS indexes (for which state data begin in 1932). The final series was derived by adjusting the data for 1939 on the basis of independent estimates derived from UI data, then extrapolating back to 1929-38 as was done for manufacturing.

Finance, Insurance and Real Estate: Data for banks are relatively good. Annual data on national bank, and state Federal Reserve member bank payrolls were obtained from the Office of the Comptroller of the Currency and the Federal Reserve. Data for state non-Federal Reserve member banks came from the FDIC on an annual basis beginning in 1935 (data for earlier years were extrapolated back to 1929). Data for other finance areas, insurance, and real estate were based on census information for 1929, 1935, and 1939, and then interpolated using various series.

Transportation: *Railroads*: Separate estimates for 1930, 1938, and 1940 were based on census and unemployment data. Annual data from the Interstate Commerce Commission, the Association of American Railroads, and other sources were used to interpolate annual estimates. The authors deem these data to be "reliable" (p. 83). *Other transportation*: Various census data and interpolation methods, including UI data for covered industries, were used.

Communications and Public Utilities: Various data, including Bell System (AT&T) records, information provided by the ICC and FCC and some census data (e.g., Census of Radio Broadcasting, 1935) were used.

Services: Various sources, including censuses of business (1929, 1933, 1935, and 1939) and UI data (1938-) were used.

Governments: *Federal*: Annual, state-level data are available for some agencies (e.g., Post Office) beginning in 1929, and later years for others (e.g., other executive agencies, 1937-). *State and Local*: Annual estimates were based on Department of Labor surveys and other sources.

Other Industries (agricultural services, forestry, fisheries, and rest-of-world): Various sources of data.

Adjustments for Residence: For the 1930s, the only adjustments were for D.C., Maryland, and Virginia to adjust for civilian federal government employees who work in D.C. but reside in Maryland or Virginia.

2. Proprietors' Income (ranged from 17-25 percent of total personal income): Annual data are considerably less reliable than for wages/salaries. Benchmark data were often interpolated using data on payroll changes within each industry, i.e., "differences among states in industry-weighted payroll indexes are taken to indicate year-to-year changes in the relative state distribution of total nonfarm proprietors' income." For *professional services*, annual state income estimates were derived using national income data for these services, survey information, and information on the number of practitioners in each state. *Business income*: National level data were allocated on the basis of the available data "deemed to indicate best the relative state distribution of proprietors' income," including data on sales, payrolls, number of proprietors, etc. (p. 107). Interpolation of benchmark years was usually done using payroll data. *Farm income*: Annual estimates from 1929 based on data on cash receipts and production expenses. It appears that data from the Agricultural Censuses of 1929 and 1939 were the basis of state estimates, with various series used to interpolate estimates for individual years.

3. Property Income (ranged from 17-25 percent of total personal income): Internal Revenue Service data aggregated at the national level was apportioned among states using various series. These include data on income reported by fiduciaries by state, first available in 1938. State level data on government interest payments to individuals are available from 1932 onward.

4. Other Income Components (less than 5 percent of total personal income): *Other labor income*: minimal data to make annual state-level estimates – appears to have been based on payroll surveys. *Transfer payments*: various sources; good data for New Deal transfers. *Personal Contributions to Social insurance*: various sources. Minimal before mid-1930s.

Appendix 2

Appendix Table A1 - First Stage Regressions:

Model (3) and Model (4) in Table 3 (this working paper)

Model (1) and (2) in Table 3 (*JEH* paper)

	Instrumented Variables			
Instruments	Bank Failure Rate		Spatial Lag (*W*y)	
Constant	0.437	(1.66)	0.246	(1.60)
Per Capita Income 1929	0.000065	(1.16)	-0.000015	(0.45)
Industry Structure 1929	-0.189	(0.24)	0.140	(0.31)
Govt. Share of Income 1929	0.691	(1.29)	0.0044	(0.01)
Deposits Per Bank 1929	-0.0000106	(0.34)	0.0000023	(1.28)
Percent National Banks 1929	-0.202***	(3.23)	0.142***	(3.87)
Percent Nat'l Deposits 1929	-0.0044	(0.09)	-0.0847***	(3.01)
Minimum Bank Capital 1929	0.00087*	(1.88)	0.000066	(0.24)
Percent Rural Population 1930	0.0128	(0.15)	0.021	(0.45)
W • Per Capita Income 1929	-0.00013	(1.62)	-0.000032	(0.68)
W • Industry Structure 1929	2.122	(1.57)	3.846***	(4.87)
W • Govt. Income Share 1929	0.356	(0.43)	-0.293	(0.61)
R^2	0.554		0.800	

Note: *** denotes significance at 1%, ** at 5%, and * at 10%. Absolute t-statistics in parentheses.
Number of observations = 48.

Appendix Table A2 -First Stage Regressions:

Model (3) and Model (5) in Table 4 (this working paper)

Model (3) and Model (4) in Table 3 (*JEH* paper)

	Instrumented Variables			
Instruments	Per Capita New Deal Spending		Spatial Lag (Wy)	
Constant	528.43	(1.46)	4.633**	(2.17)
Per Capita Income 1933	0.0427	(1.13)	0.000191	(0.86)
Industry Structure 1933	-212.50	(0.09)	-6.861	(0.48)
Govt. Share of Income 1933	334.28***	(3.14)	0.9446	(1.50)
Percent Democratic Votes	7.877	(0.23)	-0.534**	(2.66)
St. Dev. of Dem. Votes	204.99**	(2.22)	0.689	(1.27)
Voter Participation	41.143*	(1.83)	0.168	(1.27)
Percent Federal Land	47.072***	(3.09)	-0.031	(0.34)
Percent Church Membership	-57.321**	(2.02)	0.071	(0.42)
W • Per Capita Income 1933	-0.022	(0.40)	-0.0011***	(3.40)
W • Industry Structure 1933	-8056.337	(1.54)	-53.72*	(1.74)
W • Govt. Income Share 1933	113.548	(0.56)	2.462**	(2.06)
R^2	0.778		0.759	

Note: *** denotes significance at 1%, ** at 5%, and * at 10%. Absolute t-statistics in parentheses.
Number of observations = 48.

Appendix Table A3 -First Stage Regressions:

Model (4) and Model (6) in Table 4 (this working paper)

Model (5) and Model (6) in Table 3 (*JEH* paper)

Instruments	Instrumented Variables: Per Capita New Deal Spending		Instrumented Variables: Spatial Lag (*W*y)	
Constant	729.67**	(2.00)	3.600*	(1.81)
Per Capita Income 1933	0.0403	(1.17)	0.00021	(1.14)
Industry Structure 1933	-2429.68	(1.04)	-10.439	(0.82)
Govt. Share of Income 1933	328.76***	(3.08)	0.653	(1.12)
Percent Democratic Votes	40.682	(1.16)	-0.321	(1.68)
St. Dev. of Dem. Votes	153.92	(1.64)	0.0981	(0.19)
Voter Participation	35.602	(1.48)	-0.101	(0.77)
Percent Federal Land	110.82***	(3.95)	0.0207	(0.13)
Percent Church Membership	-102.87***	(3.50)	0.133	(0.83)
Northeast	14.242	(0.96)	-0.0846	(1.03)
South	-1.881	(0.14)	-0.01566	(0.21)
Midwest	23.944	(1.66)	-0.0553	(0.70)
W • Northeast	37.315*	(1.76)	-0.0386	(0.33)
W • South	40.461*	(1.72)	-0.0533	(0.42)
W • Midwest	36.023*	(1.74)	0.267**	(2.36)
W • Per Capita Income 1933	0.0497	(0.66)	-0.00033	(0.81)
W • Industry Structure 1933	-10037.82*	(1.97)	-37.81	(1.35)
W • Govt. Income Share 1933	334.624	(1.58)	3.414***	(2.95)
R^2	0.851		0.861	

Note: *** denotes significance at 1%, ** at 5%, and * at 10%. Absolute t-statistics in parentheses.
Number of observations = 48.

Appendix Table A4: Ordinary Least Squares Regressions

Variable	(1) Contraction Era (1929-32)	(2) Expansion Era (1933-1939)	(3) Expansion Era (1933-1939)
Intercept	0.213*	1.730	1.432
	(1.72)	(1.22)	(1.10)
Bank Failure Rate	-0.311**	--------	--------
	(2.23)		
Average Per Capita New Deal Spending	--------	0.0033***	0.0029**
		(3.53)	(2.48)
Industry Structure (*S*) – 1929	3.888***	--------	--------
	(5.71)		
Per Capita Income – 1929	0.00008	--------	--------
	(0.23)		
State Govt. Share of Income – 1929	0.454	--------	--------
	(1.00)		
Industry Structure (*S*) – 1933	--------	-17.73	-17.029
		(0.81)	(0.86)
Per Capita Income – 1933	--------	-0.0007***	-0.0004
		(2.79)	(1.30)
State Govt. Share of Income – 1932	--------	0.647	1.891*
		(0.59)	(1.82)
Northeast Dummy	--------	--------	0.0093
			(0.10)
South Dummy	--------	--------	0.0344
			(0.39)
Midwest Dummy	--------	--------	0.235***
			(3.15)
Adjusted R^2	0.531	0.417	0.546

Note: *** denotes significance at 1%, ** at 5%, and * at 10%. Absolute t-statistics in parentheses. Number of observations = 48.