Understanding Increasing *and* Decreasing Wage Inequality

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Abstract:
This paper uses data on inequality within U.S. states to test hypotheses about the sources of rising wage inequality during the 1970s and 1980s. State labor markets are found to respond to local demand shocks in the short and medium run and to national (industry) demand shocks only after long intervals. The measure of wage inequality employed in the paper is the (log) ratio of the weekly wage at 90th percentile to that at the 10th percentile in the state after controlling for observable characteristics of the workers. Individual states are found to have very different levels and changes of inequality. For example, Pennsylvania and Georgia had the second lowest and ninth highest 90-10 ratios respectively in 1970. By 1990, Georgia's 90-10 ratio had fallen 4% while Pennsylvania's had risen 21%. This paper finds that changes in industrial composition, in particular the loss of durable manufacturing jobs, are strongly correlated with inequality increases.

KEY WORDS: wage inequality, education premia, industrial mix, skill-biased technological change, import competition
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1 Introduction

Consider two very similar economies (A and B) in 1970, sharing almost all the same markets for inputs and tradables.. Economy A has somewhat higher income per capita, an unemployment rate several points higher, and most importantly, substantially lower wage inequality. Now move forward twenty years to 1990 and reconsider the same economies. The income gap has narrowed, but not been eliminated, and the unemployment gap has remained, although both have higher levels. However, the paths of income inequality have been quite different. The formerly more unequal economy (B) has actually experienced a reduction of inequality over the period, while the initially low inequality economy (A) has seen such a large increase that their relative positions have been reversed.

This story does not fit the usual image of the evolution of income inequality during the 1970s and 1980s. A more common impression is that the increase has occurred throughout the U.S. economy and even throughout the industrialized world. This apparently common experience has actually frustrated empirical work into the sources of the overall increase in inequality as researchers have found few industries and few countries where demand for less-skilled workers has increased.

The rise in wage inequality in the United States during the 1980s has been well-documented (Levy and Murnane, 1992). Figure 1 shows the change in log wages in 1980 and 1990 relative to 1970 for male workers from the 5th to the 95th percentiles in the distribution.[1] From 1970-1980 wage earners below the 53rd percentile lost ground relative to those above them. The largest relative declines occurred in the 15th to 40th percentiles while the largest relative gains occurred in the 75-90 range. In the 1980s, relative wages declined for the bottom two thirds of the distribution while rising sharply for the top wage earners. The relative wage movements remain very similar even after controlling for observable characteristics such as education, race, location, and experience, as shown in Figure 2.[2] The bottom half of the distribution declines, in relative terms, between 1970 and 1980, while fully 80% of the distribution suffered falling relative wages from 1980-1990.

[1] The sample is described in section 2. The figure shows the relative wage change for a particular point in the wage distribution, not for an individual worker. Geometric means have been removed for all years. the change in the geometric mean was negative in the 1970s and positive in the 1980s.

[2] Figure 2 plots the distribution of residuals from the regressions in Table 3.

These striking changes in relative wages have generated a large literature by way of explanation. Indeed the search for culprits has now extended worldwide and a growing body of papers have attributed rising unemployment in continental Europe to same forces that are generating rising inequality in the U.S. and the U.K.(for example, see Berman, Bound, and Machin, 1997).[3]

Is it true that wage inequality increases have occurred throughout the industrialized world? Are there actually economies that experienced declines in wage inequality during this period? In this paper we argue that the rise in wage inequality has been far from uniform among a set of economies that are thought to have many more similarities than differences. In particular, examples of economies with declining inequality from 1970 to 1990 are close at hand, Virginia (-7.0%), North Dakota (-5.9%), North Carolina (-4.0%), Hawaii (-4.0%), Georgia (-3.9%), Mississippi (-2.8%), and South Carolina (-1.3%). Economies with dramatically rising inequality over the same period include Oregon (24.5%), Wyoming (23.2%), Michigan (21.9%), New York (20.8%), and Pennsylvania (20.5%).[4]

We argue that any theory of the rise in income inequality in the U.S. as a whole should also be capable of explaining the wide variety of outcomes across individual states. In this paper we revisit the debate over the sources of the increase in wage inequality in the U.S. by focusing on the evolution of inequality in different labor markets. Prior research on inequality has almost always assumed that workers can be pooled across regions in an attempt to identify sources of the increase in relative demand for skilled workers.[5] A key element in our analysis is the extent of integration of U.S. labor markets. If shocks to regions are transmitted quickly throughout the economy, then regional labor markets will provide little additional information in the search

[3]These authors point to inequality increases in some less-developed countries as further evidence of the worldwide aspect of this phenomenon.

[4]The inequality measure is the 90-10 difference in log real wages after controlling for education, experience, race, and other characteristics. The numbers are the changes in the 90-10 difference from 1970-1990.

[5]Bound and Holzer (1996) also use the PUMS from the Decennial Census to examine the importance of regional shocks on college/highschool and black/white wage differentials. They find important effects from local demand shocks as well as supply effects from migration at the top end of the wage distribution. Additonal work using regional data to examine inequality include Topel (1994) and Borjas and Ramey (1995). The former uses broad regional measures to discuss the impact of immigration on wages. The latter uses wage data on metropolitan areas to assess the effect of foreign competition on the returns to education.

for the causes of increasing wage inequality. However, if shocks to regional labor demand (and supply) are only slowly transmitted to the rest of the economy then we can use them to identify important sources of the increases in wage inequality.

The large literature on wage inequality has identified a set of potential culprits. These typically include (roughly in order of prominence in the literature) skill-biased technological change (Bound and Johnson 1992; Katz and Murphy 1992; Berman, Bound , and Griliches, 1994) international trade (Borjas and Ramey, 1994, 1995; Wood, 1995), immigration (Topel, 1993), and labor market institutions such as unions and minimum wage changes (DiNardo, Fortin, and Lemieux, 1996; Fortin and Lemieux, 1997). One difficulty that previous researchers have encountered is the apparently ubiquitous rise in inequality both within and between groups of workers and industries. This has led to a general consensus among researchers that changing demand across industries, with the possible exception of international trade, has not played a significant role in the rise in wage differentials.[6] Examples of these conclusions appear frequently in the literature on wage inequality:

> "It is clear that not very much of the wage changes of the 1980's can be explained ... by changes in the industrial wage structure or in the incidence of unionism. It is necessary to focus... on changes in relative competitive wage levels."
> Bound and Johnson (1992)

> "Measured changes in the allocation of labor demand between sectors ... can account for a large minority of the secular demand shifts in favor of groups with rising relative wages....The majority of the required demand shifts in favor of more-educated workers and females reflect difficult to measure changes in within-sector relative labor demand."
> Katz and Murphy (1992)

> "... we find that less than one-third of the shift of employment from production to non-production workers can be accounted for by "between-industry" shifts...."
> Berman, Bound, and Griliches (1994)

[6]Based on anecdotal evidence (questioning economists at conferences), we have found widespread, if not universal, agreement with the proposition that cross-industry effects are not a significant source of increased inequality. However, it is hard to get individual researchers to identify the citations that are the basis for this opinion.

In their survey article, Levy and Murnane (1992) conclude emphatically:

> "However, the plight of young, less educated males cannot be viewed primarily as a consequence of deindustrialization. Declines in the relative demand for less educated workers occurred within industries - most dramatically within manufacturing where semi-skilled jobs declined at a much faster rate than overall manufacturing employment."

Subsequent research has often started from the assumption that industry level changes in demand at best are small contributors to the overall rise in inequality. However, almost all of the previous work on the inequality rise has focused on the longitudinal aspects of any given data set and ignored variations across geographic units.

Why have economists concluded that changing industry mix, and in particular the loss of manufacturing jobs, was not a major factor in the inequality rise? Research on the rise in inequality has been quite careful about creating appropriate groups by worker characteristics (industry, occupation, education, experience, race, and sex) with the notable exception of location. Katz and Murphy (1992), in their highly influential paper on the topic, divide workers into 12 industries, 3 occupations and 8 gender-education groups. All these however, make no distinction for the location of the individual - an appropriate assumption if wages and employment are determined by national, integrated labor markets.

In this paper, we construct measures of inequality for each state in the U.S.. While the identification of individual states with separate labor markets is not ideal,[7] the extent to which individual states experience distinct shocks to the labor market will allow us to identify the importance of those shocks in the widening of the income distribution. One caveat concerns aggregate shocks that do not differ across states. Krugman (1995) and Berman, Bound, and Machin (1997) argue that skill-biased technological change has been pervasive, both within countries and across countries. In our approach, we will miss aggregate shocks which move the wage distribution homogeneously across states.

[7] Identifying Connecticut as a distinct labor market from those in New York, Massachusetts or Rhode Island is not correct. This distinction is perhaps still preferable to assuming that the market for labor in Connecticut is integrated with Georgia, Arizona, etc.

We concentrate on a set of guiding questions. Does the level of wage dispersion vary across regions? Are increases in inequality uniform across states? Are increases in inequality proportional to initial inequality? Does this heterogeneity across regions allow us to identify the sources of rising inequality?

The plan for the paper is quite simple. We start by assessing the assumption that regional labor markets are not well integrated, at least over short or medium horizons. Then, we provide evidence on the large variation in inequality of both returns to observable characteristics such as education and residual wage inequality (unobservable characteristics) across states at any point in time. We then document the variation in the changes of state residual wage inequality from 1970-1990 and attempt to associate these movements with common explanations for the inequality rise.

2 Evidence on the Integration of U.S. Labor Markets

A key assumption we will maintain in searching for causes of the rise in wage inequality is that labor markets in the U.S. are integrated only in the long run.

There is little recent research on the extent of the integration of labor markets across regions in the U.S.. Blanchard and Katz (1992) consider the consequences of state-specific shocks on the paths of unemployment, wages, and migration over various horizons. While their conclusions support the argument that labor markets are integrated in the long run (beyond ten years), there are substantial disturbances to local labor markets in the short and medium term. Blanchard and Katz (1992) find that the effects of an employment shock on the unemployment rate peak at two years and are completely dissipated after 6 years. Wages show a more persistent response with the maximal decline occurring 6 years after a negative employment shock and some effects lingering for more than 10 years.

We provide two additional pieces of evidence on the integration of regional labor markets. First, we calculate the returns to different levels of education in each state. Strongly integrated state labor markets should not display large, persistent differentials in education returns. Next, we estimate the relative impact of regional and industry employment shocks to plant-level wages. If integration fails in the near term, we hypothesize that regional employment shocks should have a stronger and more immediate impact on wages than industry shocks.

2.1 Persistence of education premia

For our state level analyses, the data on wages comes from the Public Use Micro Samples from the Decennial Censuses of 1970, 1980, and 1990. The samples of the population available for those years are 1%, 5%, and 5%, respectively. We restrict our attention to the real weekly wages of non-immigrant adult males, ages 18-65 inclusive, employed 14 weeks or more during the year and not self-employed. We use a simple wage regression, estimated separately for each state for each year:[8]

$$\ln WW = f\left(g\left(\text{experience}\right), \text{race, eduation, weeks worked, location}\right) \quad (1)$$

where $g\left(\cdot\right)$ is a quartic in experience and there are two dummy variables for race (Black and Hispanic) and four for education (No High School Degree, Some College, College Degree, Advanced Degree [6+ years of tertiary education]). The location variable is a dummy for residents outside a metropolitan area (SMSA).

The education premia are percentage differences from the wages of a male worker with a high school degree in the same state and are reported in Table 1. The premia show substantial heterogeneity across states. In 1970, workers with a college degree on average earned 55% more than high school graduates in South Dakota but only 28% more in Utah. The mean state wage premia for a college degree in 1970 was 43% and the standard deviation across states was 5.9%. Similarly, in 1970, the negative effect of not finishing high school ranged from -11% in Nevada to -34% in Tennessee.

In 1990, education premia continued to show substantial dispersion across states. The wage premium for a college degree ranged from 27% in Wyoming to 52% in Texas. The mean and standard deviation across states were 43% and 6.2% respectively. The range of premia across states was substantial for all levels of education for all years, suggesting that, at a point in time, regional labor markets support very different relative returns to education.

The existence of different education premia in any year might be explained by temporary shocks to the regional labor markets. However, the premia are also quite persistent over time. Correlations across decades typically range

[8]Our specification of the log wage regression follows that often employed in the literature on inequality. (See Juhn, Murphy, and Pierce, 1993; and Gottschalk, 1997).

from 0.5-0.8.[9] Except for the 'some college' category, all the education premia show significant positive correlations over time. Figures 3 and 4 show the advanced degree and no high school premia. This evidence suggests that even over 10 or 20 year intervals, labor markets in different states do not adjust to equate the returns to education.[10]

2.2 State and industry employment shocks

We use plant level data from the manufacturing sector to explore whether industry or regional employment shocks have a greater impact on wages. We make use of the plant level data from the Annual Surveys of Manufactures (ASM) from 1972-1987 which covers wages and employment and includes approximately 50,000 plants each year. We estimate an equation of the form,

$$\Delta \ln w_{ispt} = d_t + A(L)\Delta \ln N_{i,\notin s,t} + B(L)\Delta \ln N_{\notin i,s,t} + \epsilon_{ispt} \tag{2}$$

where $\Delta \ln w_{ispt}$ is the percentage change in wages at plant p in (2-digit) industry i in state s from time $t-1$ to t. $\Delta \ln N_{i,\notin s,t}$ is the change in employment in the industry outside the state, $\Delta \ln N_{\notin i,s,t}$ is the change in employment in the state outside the industry, d_t is a vector of time dummies, and ϵ_{ispt} captures all other shocks to the plant. We include 9 annual lags of the employment changes to allow for slow adjustment of wages. The dependent variable is the percentage change in the average real wage per worker at the plant less the average change across all plants. For each plant, the state employment shocks are constructed as the percentage change in employment in the state outside the 2-digit industry of the plant. Similarly the industry shock is the percentage change in employment in the same 2-digit industry outside the state. Both types of employment shocks are adjusted to be mean zero in given year.

In using this specification, we are making the assumption that shocks to individual plants are small relative to the labor market as a whole. In addition, we are assuming that annual changes in the wage are driven exclusively by shocks to labor demand. If, as we suspect, labor demand shocks to the region regardless of industry are relatively more important than nationwide

[9] The single exception is 'some college' where the correlation was 0.04 between 1970 and 1980. This result is driven largely by Wyoming and Alaska.

[10] One objection to this interpretation is that the variation in state education premia merely reflects the quality of education provided in the state which is itself persistent over time.

industry labor demand shocks, we should expect to see larger coefficients on recent lags of the state employment changes, and lower, delayed responses to industry employment changes.

The results for the regression are presented in Table 2 and the cumulative effect of a 1% negative employment change is shown in Figure 3. The response path for the two types of wage shocks is quite different and in accord with the prediction that regional labor markets clear much more quickly than national labor markets. Wages immediately fall more than twice as much in response to a state employment shock than an industry shock. The wage response to a 1% decrease in state employment peaks at 0.21% after 3 years before gradually diminishing. Industry shocks are fully felt only after 8 years. The response of plant wages confirms our hypothesis that labor markets clear only locally in the short run and that shocks are transmitted nationally only after long delays.[11]

In this section, we have assembled evidence that state labor markets are not well integrated in the short or medium term. The persistence of regional employment shocks on relative wages, the magnitude and persistence of the state education premia, and the relative importance of regional rather than industry shocks to employment on local wages all lead us to conclude that shocks to state labor markets will have important effects on the level and distribution of wages.

3 Returns to Observable Characteristics

The literature on rising wage inequality has identified several distinct trends in the data. As noted by numerous authors, the overall increase in wage dispersion consists of at least two distinct phenomena. One is the increase in returns to observable worker characteristics such as experience and education. The second is the dramatic rise in within-group inequality, the so-called returns to skill. In the rest of this paper, we concentrate almost exclusively on the increase in the returns to unobserved skill and leave aside the issue of the increasing returns to education. Since, by definition, skill is not directly observable, we follow others in the labor literature (see Juhn, Murphy, and Pierce, 1993; Gottschalk, 1997) and calculate the returns to skill as the residual from a standard wage regression.

[11] We have also run the plant wage regressions including shock to the own industry-state. The results do not change.

We again estimate the wage regression separately for the three Census years, pooling the data across states but allowing for variation in state mean wages.[12] The wage regression is of the form given in Equation 1 and the results are given in Table 3.[13]

The well-known pattern of returns to observable characteristics are evident in these regressions. In 1970, relative to high school graduates, men without high school degrees earned almost 22% less, while college degree holder earned almost 44% more. Men with some college earned a more modest wage premium of 11% while individuals who acquired additional tertiary education gained on average an extra 5% above college degree holders. Observables explain 31% of the overall variation in log wages in 1970.[14]

In general, the 1980 results confirm prior research and show a modest decline in the premium for tertiary education relative to high school degree holders as well as a slight worsening of the relative position of men without high school degrees. By 1990, however, the returns to education had changed significantly. The wages for men without a high school degree had decreased further, while the returns to a college degree rose over 10%, and the returns for further tertiary education had jumped almost 20%. In 1990 observable characteristics explained 40% of overall wage variation, a sizable increase from both 1970 and 1980.

4 Residual Wage Inequality: The Nation

While the regressions in Table 3 show part of the story of the increase in inequality, the bulk of the variation in wages remains unexplained by observable worker characteristics. Increasing returns to education only explain part of the overall increase in wage inequality. From the regressions, we calculate the distribution of the wage residual and consider the changes in the distribution over the period. We consider three measures of the residual distribution of log weekly wages, the 90-10 wage differential and the 90-50 and 50-10 differentials.

[12] This might seem odd after our discussion of the magnitude of state education premia. However, none of the results on residual wage inequality are sensitive to whether we estimate individual state regressions or a pooled national regression.

[13] Allowing for interaction terms between the experience function and other variables did not change the results on residual inequality.

[14] Throughout this paper we restrict our discussion to the education variables among observable characteristics.

The top panel of Table 4 reports the levels and changes in those measures for the three years and two intervals from the pooled national regression. Given the large literature on the increase in within group inequality, it is not surprising that we also find a large increase in residual wage inequality as measured by the 90-10 differential in the 1970s (4.5%), and especially in the 1980s (7.3%).[15] Changes in the 1970s are split evenly between increases at the top and bottom while during the 1980s increases in inequality at the top half of the distribution were twice as large as those in the bottom half.

In the bottom panel of Table 4, we compute our three residual inequality measures after allowing all the returns to observable characteristics to vary across states. This specification lets us see how much of the increase in inequality is due to state-specific changes in the returns to age, education etc. Allowing the returns to individual characteristics to vary across states does reduce residual wage inequality for the country as a whole. However, the magnitude of the reduction is quite small and the changes over time are unaffected. For the remainder of the paper, we consider only the distribution from the pooled regression.

5 Residual Wage Inequality: The States

Thus far we have confirmed the rise in returns to education over time as well as the increase in residual inequality at the national level during both the 1970s and the 1980s. However, in Section 2, we argued that while regional labor markets are integrated over long horizons, they display substantial evidence of segregation in the short run and medium run. To use the information on individual states, we construct measures of the 90-10 differential for every state (plus the District of Columbia) in each of our three years (see Table 5). While the national 90-10 differential was 1.164 in 1970, the same measure for the states ranged from 1.013 in Connecticut to 1.188 in Oklahoma (the median state) to 1.369 in Louisiana and a phenomenal 1.634 in Alaska. The average state 90-10 difference was 1.195 with a cross-state standard deviation of 11.4%.

The figures for 1980 and 1990 show similar heterogeneity across states. In 1980, residual inequality ranged from 1.086 in New Hampshire to 1.215 in

[15] These increases are somewhat smaller than those reported elsewhere, i.e. Katz and Murphy (1992). This difference is most likely due to the fact that we allow the coefficients on individual characteristics to vary over time.

Utah (median) to 1.603 in Alaska. The state mean had increased to 1.222 with a drop in the standard deviation to 9.1%. Ten years later, the average 90-10 differential had increased dramatically to 1.274 and the dispersion remained relatively unchanged (8.3%). As with the education premia, the returns to unobserved skill varied widely across states in every year.

5.1 Increasing and decreasing inequality

The variation in the levels of inequality across states dwarfs the changes in national inequality over time. In any of the three years, a large number of states have 90-10 differentials substantially above or below the national average. In addition, states follow very different paths over time both in terms of levels and rankings. Georgia starts with the 9th highest level of inequality in 1970, but by 1990 Georgia ranks 32nd and inequality has fallen almost 4% in the state. In contrast New York moves 25 places from 15th lowest to 12th highest with an increase of more than 20% in the 90-10 differential. In fact, the changes of state wage inequality show at least as much heterogeneity as the levels themselves.

While there is no doubt that residual inequality was rising at the national level during the 1970s, 18 states actually experienced a decline in inequality during the decade (see Table 6). At the other extreme, 6 states had inequality increases at twice the national rate. Even during the 1980s, a time of dramatically increasing inequality for the country as a whole (7.3%), 2 states saw inequality decrease, and 7 others had increases of less than 3%. In fact, 36 states had slower inequality increases than the nation. For the entire twenty year period, while the national 90-10 residual increased over 11%, 7 states had net declines in inequality. The locations of states with the highest and lowest inequality changes can be seen clearly in Figure 6. In both decades, states with darker shading, representing those with the largest rises in inequality, are geographically clustered around the Great Lakes. On the other hand, the states with the lowest inequality rises, or decreases, are more likely to be in the Southeast.

Increases in inequality are correlated in the 1970s and 1980s. States with higher than average inequality increases in the first decade were more likely to also have above average increases in the 1980s (See Figure 7) but they explain only 27% of the overall variation in state inequality growth in the 1980s.

5.2 The extreme states and their importance

Table 6 reports the state changes in wage inequality sorted by performance during each decade. The twelve extreme states, six with big increases and six with declines or small increases, are highlighted in boldface. The differences between the two groups are striking. The six with the biggest increases in the 1980s (New York, Illinois, Pennsylvania, Michigan, Ohio, and Minnesota) are all large industrialized states who suffered disproportionately from the recession in the beginning of the decade and who lost large numbers of manufacturing jobs. The six best performers (Delaware, Mississippi, Alabama, Maryland, Virginia, and Georgia) are mostly southern states who expanded manufacturing employment during the decade.

While there is little doubt that states experienced very different changes in residual inequality, it is not immediately follow that this heterogeneity was important for the national increase. To quantify the importance of the individual states, we calculate the 90-10 differential with and without the groups of states that had the biggest and smallest changes. Table 7 reports the 90-10 differentials for all states together and two groups of 44 (one without the top six and one without the bottom six)

Excluding the six states with the lowest growth in wage inequality, the overall increase for the U.S. would have been 19.6% higher during the 1970s and 9.6% higher in the 1980s. The states that had the largest increases in wage inequality during the 1980s had an even larger effect on the aggregate measure. Inequality increases would have been 36% lower in the 1970s and 23% lower in the 1980s without the increases at these six states. These results suggest that the heterogeneity in state outcomes was an important determinant in the national inequality.

5.3 Mean reversion

It is possible that the heterogeneity in state outcomes merely represent mean reversion to a common level of inequality. Regressing the change in inequality on the initial level, we find that in the 1970s states with higher than average initial levels of inequality showed decreases, or smaller increases, while low inequality states tended to experience more rapid increases (see Table 8). States with 10% higher initial levels in 1970 had, on average, a 4.3% lower rise in inequality over the following decade. Initial levels explain over 40% of the variation in state performance.[16]

By contrast, in the 1980s initial levels explain only 8% of the subsequent movement in inequality across states. The relationship between initial wage differentials and subsequent changes was still negative, but on average a 10% higher initial wage differential in 1980 was associated with only 1.5% lower increase over the following decade. We can conclude that the variation in state performance in the 1980s was not simply a result of mean reversion in inequality.

6 The Explanations

The preceding sections show that shocks to regional labor markets persist over the short and medium run and that states had vastly different outcomes in terms of wage inequality during the 1970s and 1980s. In this section, we reconsider existing explanations of the rise in wage inequality using state level data. As mentioned at the outset, the dominant explanations for the national inequality increase center on the use of skill-biased technology, changes in product demand due to international trade, supply shifts due to immigration, and shifts in labor market institutions. We construct state-level variables to proxy for each of the explanations.

6.1 Skill-biased technological change

One problem with the hypothesis that skill-biased technological change has been the source of the rise in overall wage inequality is the lack of direct evidence. Krueger (1993) argues that the use of computers is associated with a wage premium but DiNardo and Pischke (1997) offer a compelling argument that computers themselves have not changed the wage structure. Since we do not have direct measures of technology either by state or for individual workers, we follow Berman, Bound and Griliches (1994) and Bernard and Jensen (1997) in using measures of the capital stock as a proxy for inputs that are complements to skills. A further limitation of these measures is that they are only available for the manufacturing sector from the ASM and Census of Manufactures, and as a result may not capture technology

[16] When additional variables are added to the specification the coefficient on lagged levels is no longer negative for either decade.

upgrading in other sectors.[17] With these caveats, the hypothesis of skill-biased technological change implies a positive relationship between increases in capital per worker and inequality within the state.

We consider two measures of skill-biased technology for each state, the log levels of machine and equipment stocks per worker in the manufacturing sector in the state (**machine**) and the log-level of computer investment per worker in manufacturing in the state (**computer**). The data are constructed from the preceding Census of Manufactures, i.e. the 1967 census for 1970, the 1977 census for the 1980 observations, and the 1987 census for the 1990 data.[18]

6.2 International trade

Ideally we would be able to measure import and export prices for all goods produced in a state. Instead we use state-level import and export exchange rates (**import** and **export**). To calculate the import exchange rate for a state, we start by constructing industry import exchange rates for each 4-digit manufacturing industry. The industry import exchange rates are given by the sum of real exchange rates indices (U.S. dollar/foreign currency)[19] across countries weighted by that country's average share in imports in the industry over the preceding three years,

$$EXCHIM_i = \sum_c \frac{IMP_{c,i}}{IMP_i} \cdot EXCH_c. \tag{3}$$

The state import exchange rate is the weighted sum of industry import exchange rates with the weights given by the share of the industry in total shipments from the state, averaged over the sample,

$$I_{st} = \sum_i \frac{TVS_{s,i}}{TVS_s} \cdot EXCHIM_i. \tag{4}$$

The expected relationship between the state import exchange rate and inequality is negative. A strengthening dollar means cheaper imports in goods

[17]In an alternative view of skill-biased technological change, Acemoglu (1998) models the increase in skill-biased technology as an endogenous response to the supply of skills. If correct, our measures of computers and machines will not correctly proxy for the changes in skill-biased technology.

[18]The computer investment data are not available for 1970.

[19]The exchange rates are nominal exchange rates deflated by GDP deflators in foreign currency per U.S. dollar normalized to be 100 in 1980.

that are produced in the state. If a state contains industries that experience substantial import penetration, and imports are generally produced with less-skilled labor then state level inequality should rise.

The state export exchange rate is constructed in a comparable fashion

$$EXCHEX_i = \sum_c \frac{EXP_{c,i}}{EXP_i} \cdot EXCH_c. \tag{5}$$

The state export exchange rate is the weighted sum of industry export exchange rates with the weights given by the share of the industry in total exports from the state[20]

$$X_{st} = \sum_i \frac{EXP_{s,i}}{EXP_s} \cdot EXCHEX_i \tag{6}$$

If exports are skill-intensive products, as found in Bernard and Jensen (1995, 1997) we should expect to see a positive relationship between the state export exchange rate and inequality.

The main difficulty with both exchange rate measures stems from the inequality data itself. Since we only observe states in three years, our exchange rate measures may not capture the effects of the dollar movements in the first half of the 1980s.

6.3 Industry composition

To capture changes in the composition of output at the state level, we include a measure of durable manufacturing employment for the state. Specifically we calculate the ratio of durable manufacturing employment to total employment in the three Census samples (**durable**). The pictures of the wage inequality changes in Figure 6 suggest that manufacturing intensive states saw disproportionate rises in wage inequality. We expect that changes in durable employment would be negatively correlated with inequality changes.

Another measure of product demand is the level of government procurement in the state. The measure is constructed from the government procurement data of Hooker and Knetter (1997) and is given by the log-level of government procurement expenditures per capita (**procure**). Since the government contracts captured in the data tend to be for large skill-intensive products, the expected relationship with inequality is positive.

[20] Due to a lack of state-industry export data in earlier years, we are forced to use weights based on the 1987 Census.

6.4 Immigration

To evaluate the potential role for foreign immigration in depressing low-skill worker wages, and thus increasing inequality we include the ratio of recent immigrants to the population (**immigrant**). Immigrants are those workers who immigrated to the state within the last five years of the prior decade.[21] The expected relationship of immigration and inequality is positive if the pool of immigrant labor is generally less-skilled than the existing stock of native workers.[22]

6.5 Labor market institutions

Recent work by DiNardo, Fortin, and Lemieux (1996) and Fortin and Lemieux (1997) has revived interest in labor market institutions as sources of inequality increases. Lee (1998), using state data, argues that all the increase in raw inequality can be attributed to changes in state minimum wages. In particular, the decline in unionization rates and the fall in the real minimum wage are offered as important explanations for the rise in wage dispersion. We construct measures of unionization rates (**union**) for each state for the three years.[23] The data on unionization rates come from Kokkelenberg and Sockell (1985) and Hirsch and MacPherson(1993). The minimum wage data comes from Neumark and Wascher (1992). We use the log of the real state minimum wage as our measure (**minwage**).

6.6 Income levels

To capture the possibility that heterogeneity in state inequality measures is being driven by variations in state income levels we construct a measure of state economic activity. For each state we calculate the difference between the median income and the national median income (**cycle**). In our estimation framework, including state fixed effects, we expect that higher state incomes

[21] For example, for the 1980-1990 changes in inequality, the immigration measure is calculated as fraction of the state population who immigrated to the state in 1985-1990.

[22] Immigrants may have lower apparent skills in the data due to language problems or discrimination even if there actuals skill levels are higher than the native population.

[23] Barry Hirsch generously provided files with the unionization data. For early years some states appear only in groups. We assigned the group unionization rate to the state for those years. Since both sets of data start only in 1973, we use the 1973 values for 1970.

would be correlated with peaks in the state business cycle and associated with lower levels of inequality.

7 Explaining State Inequality Changes

Ideally any explanation for the large rise in inequality during the 1980s would be capable of explaining smaller increases in other periods. For our estimation procedure, we choose to pool the data across decades instead of estimating decade by decade regressions.[24] We estimate the relationship between our explanatory variables and state residual wage inequality, as measured by the log 90-10 ratio, in levels, pooled across years with state fixed effects.[25]

Table 9 contains univariate regressions of state inequality on each of our explanatory variables in columns 1 through 10. Almost all the variables are significantly correlated with inequality changes and have the expected sign. The measure of durable employment share is negatively and significantly correlated with changes in inequality across states (column 1) and can explain almost 30% of the variance over the two decades. A 1% change in the fraction of the sample employed in manufacturing is associated with a 1.58% increase in the 90-10 ratio.

Both measures of technology deepening, log capital per worker and computer investment per worker are positively correlated with inequality across states. The capital intensity measure by itself accounts for over 20% of the variation while for the 1980s, computer investment changes can explain over 40% of the total state heterogeneity.[26]

Deunionization is also strongly correlated with increasing inequality. Decline in union membership rates can account for almost 30% of the variation in the pooled estimation. The minimum wage measure does the best of all the state-level measures. It is strongly negatively correlated with increases in inequality and accounts for 45% of total variation.

Increased immigration also shows up with a positive and significant coefficient although its overall explanatory power is low. Similarly, our measure of aggregate state economic activity confirms that states moving from business cycle troughs to peaks have declines in inequality, although the measure

[24] In Table 11, we also report estimates for changes during the 1980s.

[25] Pooled estimation in first differences across the decades does not yield different conclusions.

[26] The computer measure is not available before 1980.

cannot explain much of the cross-state variation in the two decades.

Surprisingly, our measures of international trade do not perform well. The import exchange rate has the wrong sign, appreciation of the dollar on an import basis leads to declines in inequality while the export exchange rate is not significant.[27] The measure of government purchases per capita is significant but unexpectedly negatively correlated with inequality.

These univariate results suggest that a wide range of potential explanations may play a role in the increase in inequality. Minimum wage changes, decreases in durable manufacturing employment, decreased unionization and an increase in capital per worker all have substantial explanatory power. However, one drawback with the specification in Table 9 is that we have neglected to control for time effects, i.e. any unobserved aggregate trending variable could be driving movements in both our LHS and RHS variables. We would like to know how robust the univariate are in the presence of time trends.

Table 10 reports the same set of regressions with time dummies, i.e. separate time trends for each decade. The differences in the results are quite substantial. Of the previously significant regressors, only durable employment and the business cycle measure remain statistically significant. In addition, the coefficient on the export exchange rate switches to a negative sign and becomes significant, suggesting that depreciations that stimulate exports may reduce inequality.[28] In other words, only changes in durable employment and business cycles are correlated with differential movements in inequality across states within decades. In particular, the prior significance of the state minimum wage was due almost entirely to its aggregate trend movements and not due to variation across states.

We consider a multivariate specification with all our potential explanatory variables in Table 11. Columns 1 and 2 report pooled results for both decades without and with time dummies respectively, while columns 3 and 4 reports results just for the 1980s. In all specifications for both time periods, the share of durable manufacturing employment and the state of the state business cycle enter significantly and with the expected sign. Declines in

[27]We caution that this does not mean that international trade was unimportant for inequality increases. The decade-long span of our data may hide the role of trade. Preliminary work looking at state-level foreign direct investment shows mixed results.

[28]Bernard and Jensen (1997) find that exporters contribute to increases in wage differentials between production and non-production workers. However, this may reflect changes in education premia as opposed to changes in residual wage inequality.

durable manufacturing employment are strongly associated with inequality increases, even allowing for the presence of alternative explanatory variables. Similarly, state business cycles expansions are associated with declines in residual inequality, and recessions are times of increasing inequality. The state minimum wage measure is again significant only in the specifications without time trends. Of the other explanatory variables, measures of capital intensity, immigration, exchange rates, unionization or government procurement, none are close to being significant, except for the import exchange rate measure in the 1980s which has the wrong sign.

8 Inequality at the Top and Bottom

The preceding results focused on changes in the log 90-10 ratio of residual wages. In this section, we explore what differences, if any, results from looking at changes in the top and bottom halves of the residual wage distribution. Table 12 reports specifications for the 90-50 and 50-10 inequality measures with and without time trends. All regressions are pooled over both decades estimated in levels with state fixed effects.

The results for the 90-50 ratio in columns 1 and 2 of Table 12. Increases in inequality in the upper half of the residual wage distribution are significantly negatively correlated with the share of durable manufacturing employment, although the point estimates are less than half those of the entire distribution. In the specification without time trends, we also find significiant effects of immigration and the two exchange rates. The exchange rates have the expected sign, a strengthening dollar increase inequality through imports, but a weakening dollar increases inequality through exports. Surprisingly, the minimum wage measure enters with the expected sign and significantly. We suspect this result is again due to decade trends, as most, if not all, economic theories would suggest that changes in the minimum wage should not affect this part of the wage distribution. The state of the business cycle, while significant for changes in the 90-10 differential, does not affect dispersion at the top of the distribution.

Looking at the results for the 50-10 ratio in columns 3 and 4, we find some surprising differences. Overall, our set of variables explains less of the cross-state inequality movements in this part of the distribution. Durable employment, as always, is negative and strongly significant witha much larger coefficient. However, inequality increases in the bottom of the skill distribution are not significantly correlated with either the measure of technology, the exchange rate measures, nor changes in state minimum wages. In addition, the coefficient on immigration has the opposite sign from what we might expect and is marginally significant. The business cycle measure is now strongly significant with the expected sign.

Taken as a group, these results confirm the importance of durable employment in accounting for inequality changes through the skill distribution. They also highlight the relative importance of business cycles on wage movements in the bottom half of the distribution. The resutls for state minimum wages largely confirm our earlier findings and suggest that minimum wage changes are not driving large increases in inequality.

9 Conclusions

In this paper, we argue that the previous research on wage inequality in the United States has largely overlooked an important source of information, the heterogeneity of inequality movements across regions.[29] We suspect this oversight stems from an assumption that individuals participate in a single national labor market. If there is one nation-wide market setting wages, then there is no reason to look at regional data to understand sources of the rise in wage inequality. If, however, regional labor markets experience idiosyncratic shocks that are only slowly transmitted to other areas, then we can potentially learn about the sources of inequality from the experiences of different regions.

We find that the assumption of a single national labor market fails in the data. Blanchard and Katz (1992) show persistent effects of state employment shocks. In addition, we find that education premia show large, persistent differences across states suggesting that flows of workers and firms are not sufficient to eliminate wage differentials. Finally, we show that regional employment shocks have large effects on plant level wages.[30]

The story that emerges from most of the prior literature on wage inequality in the U.S. is one of a remarkably consistent increase during the 1970s and 1980s across and within groups (industries, education categories etc.).

[29] As mentioned earlier, important exceptions are Bound and Holzer (1996), Borjas and Ramey (1994, 1995) and Topel (1993)

[30] We encourage further research on the integration regional labor markets, whether it is increasing and for which types of workers.

The state-level data provides a very different view. Measures of state inequality show a remarkable variety of levels and changes over time. In any given year, numerous states have levels of inequality far from the national average in both directions. More importantly, the relative positions of the states change sharply from decade to decade. Numerous states with above average inequality in 1970 end up being relatively equal twenty years later and some states even improve their absolute positions over the period.

This variety of outcomes at the state level provides a natural environment for reexamining the existing theories for the overall inequality rise. To evaluate existing theories of the rise in inequality, we construct state-level measures of industrial composition, skill-biased technology, international trade shocks, and labor market institutions.

Among our results, one fact is clear. The decline in the share of durable manufacturing employment is negatively correlated with inequality increases in all our specifications, over all periods and for every segment of the residual wage distribution. By itself, the share of durable manufacturing employment can account for 30%-55% of the state changes in wage inequality, and is especially important for movements in the bottom half of the wage distribution.

The most surprising failure in our state regressions are our measures of international trade, weighted-state import and export exchange rate indices, which are not significant and usually the wrong sign. On the other hand, while immigration is not important for changes in the 90-10 ratio, increased foreign immigration is positively correlated with inequality increases in the upper half of the skill distribution, and negatively correlated in the bottom half.

The evidence collected here is a useful starting point for reconsidering possible explanations for large increase in inequality in the 1980s, and the smaller but significant increases in the returns to skill in the 1970s. Unlike previous research on inequality increases, we find an important role for the decline of manufacturing employment. These results suggest the importance of understanding the sources of and variation in manufacturing employment declines. While international trade appears not to have played a direct role in the inequality rise, its role in changing the composition of production remains to be explored. On a more positive note, the results also suggest that, to the extent that manufacturing employment has stabilized, the increases in residual wage inequality should slow as well.

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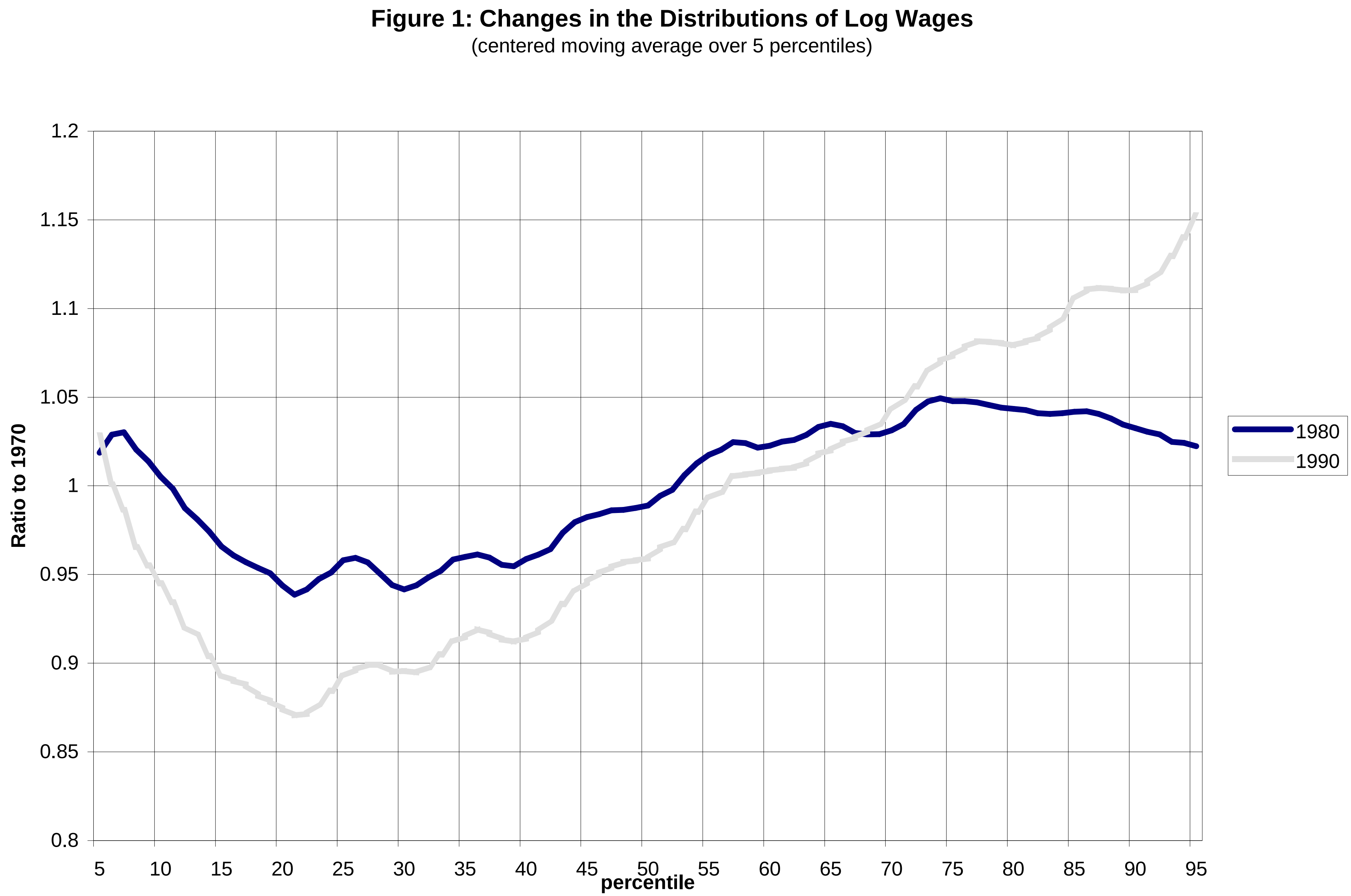


Figure 1: Changes in the Distributions of Log Wages
(centered moving average over 5 percentiles)
Ratio to 1970
1.2
1.15
1.1
1.05
1
0.95
0.9
0.85
0.8
5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95
percentile
1980
1990

Figure 2: Changes in the Distribution of Residual Wages

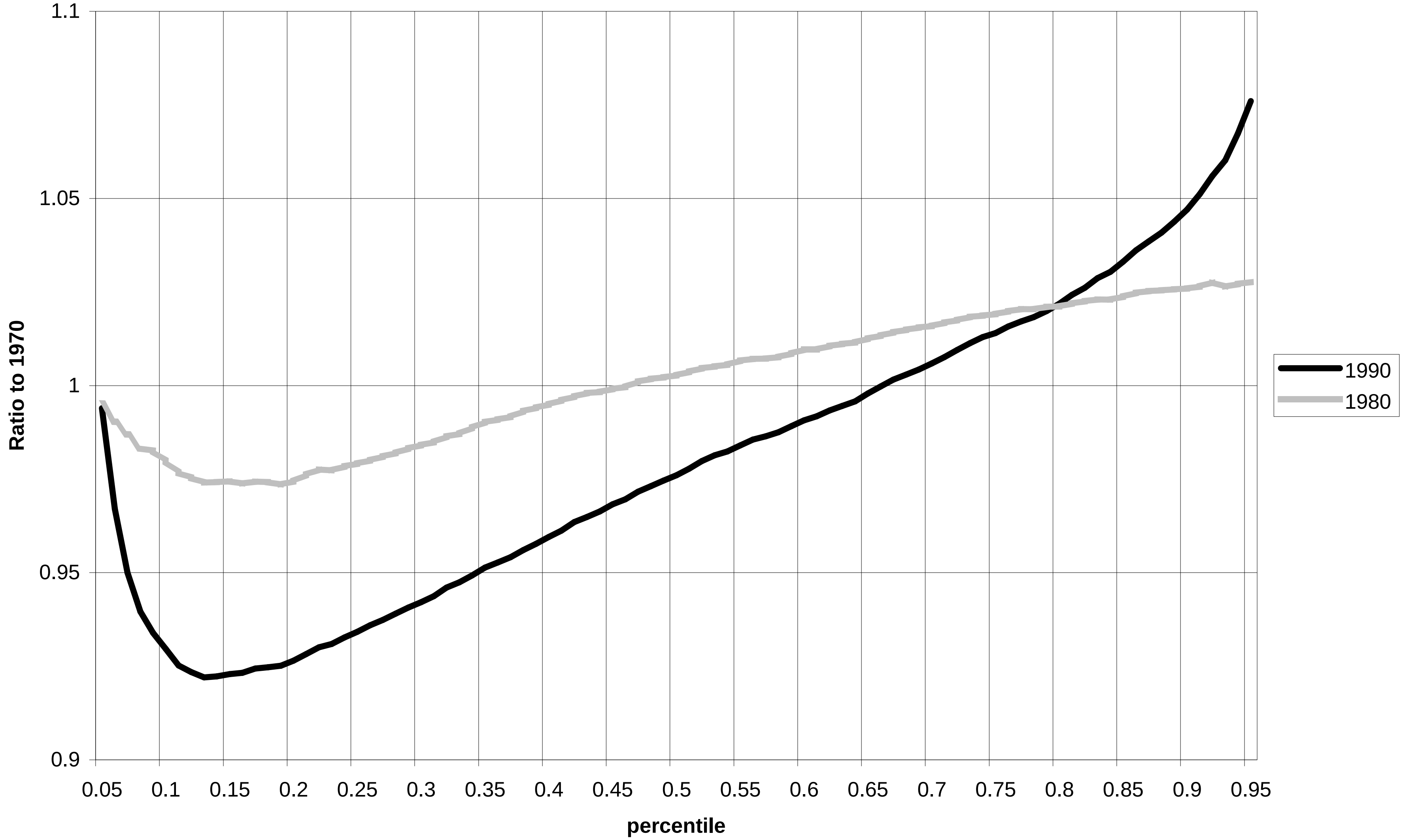
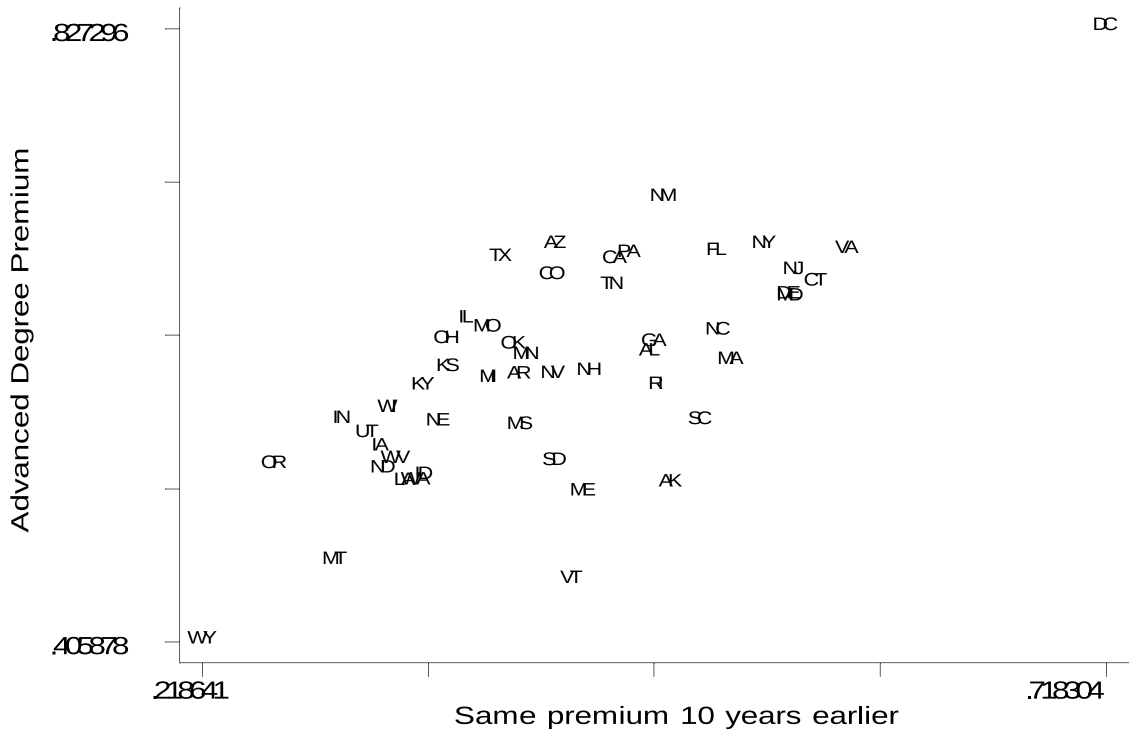


Figure 3
Persistence of Advanced Degree Premia

1980-1990



1970-1980

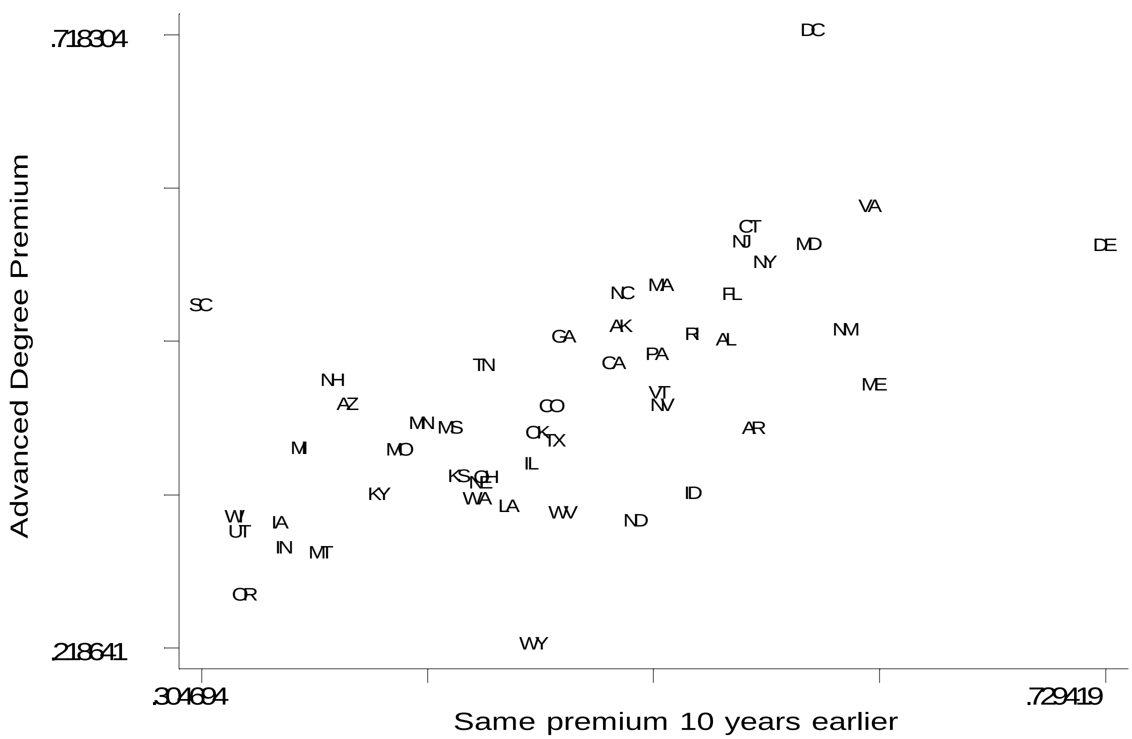
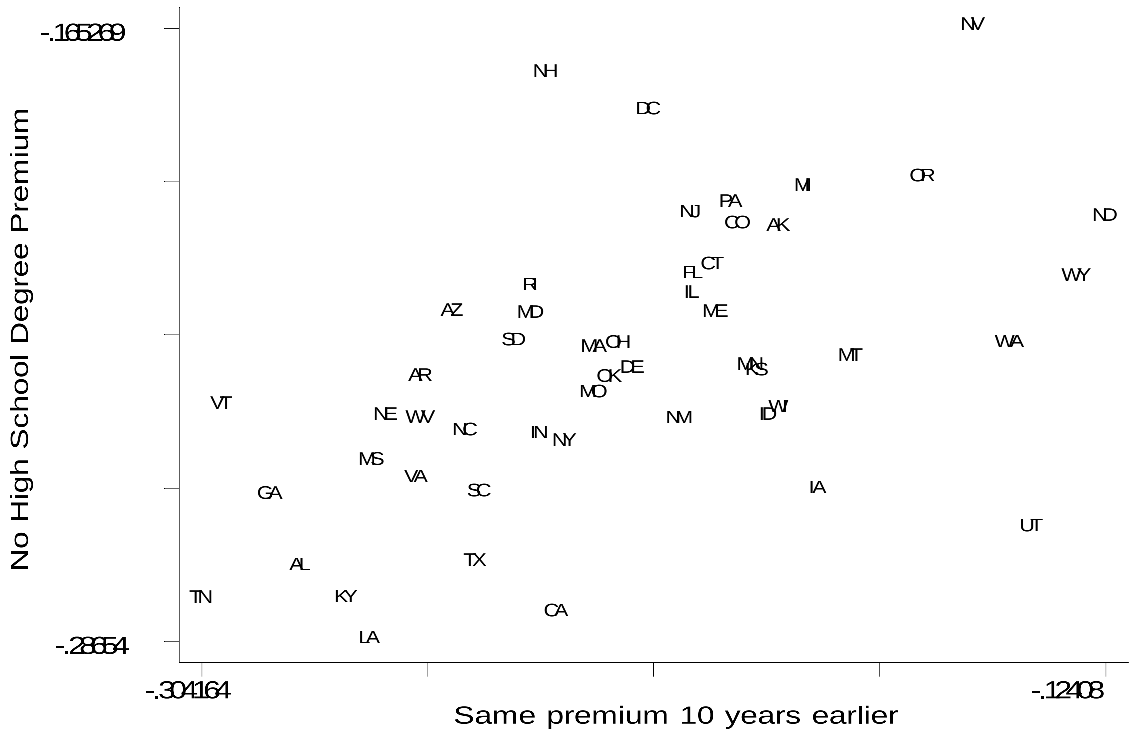


Figure 4
Persistence of No High School Degree Premia

1980-1990



1970-1980

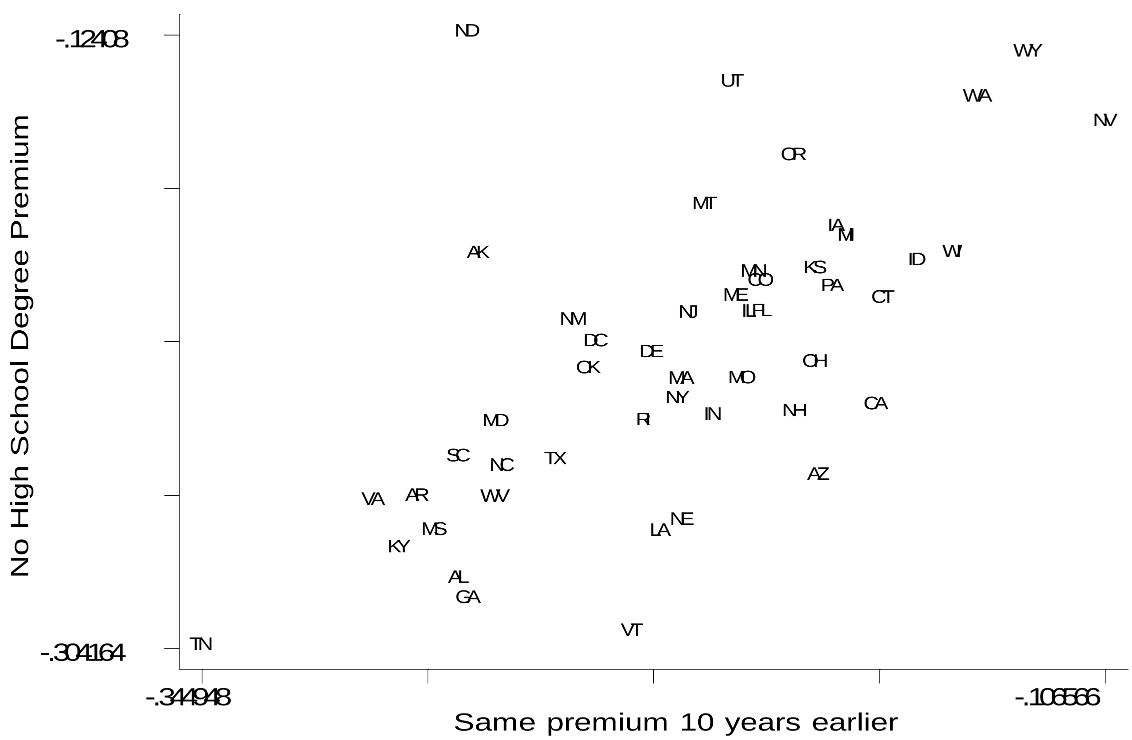


Table 1

State	No High School Diploma			Some College			College Degree			Advanced Degree (6+ yrs)		
	1990	1980	1970	1990	1980	1970	1990	1980	1970	1990	1980	1970
AK	-20.5%	-18.9%	-27.2%	10.5%	17.2%	9.4%	35.9%	37.5%	39.2%	51.4%	47.7%	50.2%
AL	-27.2%	-28.5%	-27.7%	9.0%	5.9%	11.7%	48.7%	37.6%	48.9%	60.4%	46.6%	55.1%
AR	-23.5%	-26.0%	-28.8%	10.2%	9.2%	12.7%	46.4%	38.9%	48.4%	58.8%	39.4%	56.5%
AZ	-22.2%	-25.4%	-18.2%	12.7%	5.2%	9.8%	48.7%	32.2%	37.8%	67.7%	41.4%	37.4%
CA	-28.1%	-23.4%	-16.7%	12.3%	8.3%	12.9%	45.3%	34.5%	41.6%	66.7%	44.7%	49.9%
CO	-20.5%	-19.7%	-19.7%	10.0%	7.3%	10.0%	46.4%	36.0%	38.4%	65.6%	41.2%	47.0%
CT	-21.3%	-20.2%	-16.5%	9.9%	8.4%	13.2%	48.2%	44.5%	52.2%	65.2%	55.8%	56.3%
DC	-18.2%	-21.5%	-24.1%	8.9%	7.2%	8.2%	54.2%	49.7%	42.2%	82.7%	71.8%	59.3%
DE	-23.3%	-21.8%	-22.6%	9.8%	6.2%	11.1%	47.3%	45.7%	49.2%	64.3%	54.3%	72.9%
FL	-21.4%	-20.6%	-19.7%	13.6%	8.5%	12.1%	50.1%	38.3%	44.2%	67.3%	50.3%	55.4%
GA	-25.8%	-29.1%	-27.5%	13.9%	9.5%	14.1%	50.0%	40.9%	43.5%	61.0%	46.8%	47.5%
HI	-20.7%	-20.8%	-24.7%	8.8%	8.6%	16.7%	38.9%	38.9%	47.4%	57.9%	51.7%	64.2%
IA	-25.7%	-18.1%	-17.7%	7.6%	8.3%	6.6%	38.3%	31.4%	41.4%	53.8%	31.7%	34.2%
ID	-24.2%	-19.1%	-15.6%	3.4%	4.5%	16.8%	33.6%	26.8%	36.8%	51.9%	34.1%	53.6%
IL	-21.8%	-20.7%	-20.0%	11.0%	7.1%	9.1%	46.8%	31.6%	40.1%	62.6%	36.5%	46.0%
IN	-24.6%	-23.7%	-21.0%	9.8%	6.0%	10.8%	43.9%	31.1%	42.1%	55.7%	29.6%	34.4%
KS	-23.4%	-19.4%	-18.3%	7.4%	7.6%	13.3%	43.4%	34.7%	47.2%	59.3%	35.4%	42.6%
KY	-27.8%	-27.5%	-29.3%	10.6%	6.8%	4.8%	46.9%	32.6%	40.7%	58.0%	34.0%	38.8%
LA	-28.7%	-27.1%	-22.4%	5.4%	7.4%	10.4%	39.7%	33.5%	42.4%	51.5%	33.0%	44.9%
MA	-22.9%	-22.6%	-21.8%	9.1%	8.7%	10.8%	44.0%	39.1%	44.9%	59.8%	51.1%	52.1%
MD	-22.2%	-23.8%	-26.7%	10.9%	6.9%	9.5%	47.4%	40.9%	45.4%	64.1%	54.4%	59.1%
ME	-22.2%	-20.2%	-20.4%	7.9%	9.2%	13.0%	38.4%	34.4%	47.0%	50.7%	42.9%	62.1%
MI	-19.7%	-18.4%	-17.4%	12.4%	9.2%	6.8%	43.5%	31.9%	36.7%	58.5%	37.8%	35.1%
MN	-23.2%	-19.5%	-19.9%	10.4%	7.2%	9.7%	42.6%	32.6%	42.4%	60.1%	39.8%	40.9%
MO	-23.8%	-22.6%	-20.2%	9.0%	7.7%	12.1%	44.2%	34.0%	43.9%	62.0%	37.7%	39.8%
MS	-25.1%	-27.0%	-28.3%	9.8%	7.8%	8.5%	40.5%	34.7%	34.3%	55.3%	39.4%	42.2%
MT	-23.1%	-17.5%	-21.2%	2.5%	3.3%	8.4%	29.3%	22.3%	31.2%	46.0%	29.3%	36.1%
NC	-24.5%	-25.2%	-26.6%	12.1%	9.8%	15.0%	50.2%	44.0%	53.7%	61.8%	50.4%	50.3%
ND	-20.3%	-12.4%	-27.5%	5.9%	9.6%	8.4%	40.0%	34.1%	46.1%	52.3%	31.9%	50.9%
NE	-24.2%	-26.8%	-21.8%	9.3%	8.9%	8.5%	41.5%	35.4%	39.6%	55.6%	34.9%	43.6%
NH	-17.5%	-23.5%	-18.8%	12.8%	8.5%	14.0%	42.2%	35.7%	39.8%	59.0%	43.3%	36.7%
NJ	-20.2%	-20.7%	-21.6%	13.3%	8.9%	12.3%	48.2%	41.2%	44.6%	66.0%	54.6%	55.9%
NM	-24.3%	-20.9%	-24.7%	10.9%	6.0%	10.0%	45.6%	34.8%	44.5%	71.0%	47.4%	60.8%
NV	-16.5%	-15.0%	-10.7%	7.5%	8.1%	13.6%	35.4%	29.7%	49.7%	58.8%	41.3%	52.1%
NY	-24.8%	-23.2%	-21.9%	14.4%	10.3%	11.5%	50.0%	39.2%	47.9%	67.8%	52.9%	57.0%
OH	-22.8%	-22.1%	-18.3%	9.9%	5.8%	11.2%	46.6%	31.6%	41.4%	61.3%	35.4%	43.9%
OK	-23.5%	-22.3%	-24.3%	10.3%	7.3%	12.7%	45.5%	37.2%	41.9%	60.9%	39.1%	46.3%
OR	-19.5%	-16.0%	-18.9%	7.9%	3.5%	6.1%	33.9%	24.4%	33.6%	52.6%	25.9%	32.5%
PA	-20.0%	-19.9%	-17.9%	12.3%	7.1%	10.3%	49.2%	36.1%	48.8%	67.1%	45.4%	51.9%
RI	-21.7%	-23.8%	-22.8%	9.2%	4.3%	8.5%	42.7%	35.3%	36.2%	58.1%	47.1%	53.6%
SC	-25.8%	-24.9%	-27.7%	10.9%	7.7%	5.2%	46.8%	39.7%	45.0%	55.7%	49.4%	30.5%
SD	-22.8%		-24.2%	5.9%		16.1%	39.4%		55.3%	52.8%		41.4%
TN	-27.9%	-30.4%	-34.5%	12.7%	9.0%	8.4%	49.2%	39.5%	45.2%	64.9%	44.6%	43.8%
TX	-27.1%	-25.0%	-25.2%	13.2%	7.8%	10.7%	52.4%	38.8%	42.6%	66.9%	38.4%	47.1%
UT	-26.4%	-13.9%	-20.5%	3.9%	4.5%	3.7%	31.5%	26.1%	27.9%	54.7%	31.0%	32.3%
VA	-25.5%	-26.2%	-30.0%	11.7%	9.1%	15.3%	50.4%	42.8%	52.4%	67.4%	57.5%	61.9%
VT	-24.0%	-30.0%	-23.1%	9.0%	8.6%	6.0%	30.4%	31.8%	35.4%	44.8%	42.3%	52.0%
WA	-22.8%	-14.3%	-14.0%	7.2%	7.8%	9.7%	37.6%	28.7%	42.8%	51.5%	33.7%	43.4%
WI	-24.1%	-18.9%	-14.7%	8.2%	4.7%	9.0%	39.3%	28.4%	36.4%	56.5%	32.2%	32.1%
WV	-24.3%	-26.1%	-26.8%	8.5%	4.5%	5.5%	40.4%	30.9%	32.6%	53.0%	32.5%	47.5%
WY	-21.5%	-13.0%	-12.7%	5.4%	3.9%	24.3%	27.0%	22.6%	48.6%	40.6%	21.9%	46.1%

Table 2
Response of Plant Wages to Employment Shocks

Dependent Variable: % Change in Plant Average Wages (t-1 to t)

State Employment Change	Coefficient	t-statistic	p value
t	0.0714	4.72	0.0001
t-1	-0.0063	-0.39	0.6981
t-2	0.0528	3.47	0.0005
t-3	0.0926	6.82	0.0001
t-4	-0.0674	-4.58	0.0001
t-5	0.0101	0.67	0.5023
t-6	-0.0818	-5.39	0.0001
t-7	0.0483	3.25	0.0012
t-8	-0.0665	-4.00	0.0001
t-9	-0.0245	-1.32	0.187
Industry Employment Change			
t	0.0272	3.49	0.0005
t-1	-0.0066	-0.80	0.4222
t-2	0.0121	1.44	0.149
t-3	0.0159	2.06	0.0397
t-4	0.0325	3.45	0.0006
t-5	0.0195	2.13	0.0329
t-6	0.0250	2.43	0.0152
t-7	0.0399	4.01	0.0001
t-8	0.0259	2.56	0.0104
t-9	-0.0232	-1.65	0.0998

Notes: State employment change is the percentage change in employment in the state excluding the industry. Industry employment change is the percentage change in employment in the industry outside the state. All changes are normalized to be mean zero in every year.

Figure 5: Response of Plant Wages to Regional and Industry Employment Shocks
(cumulative effect of a 1% decline in employment)

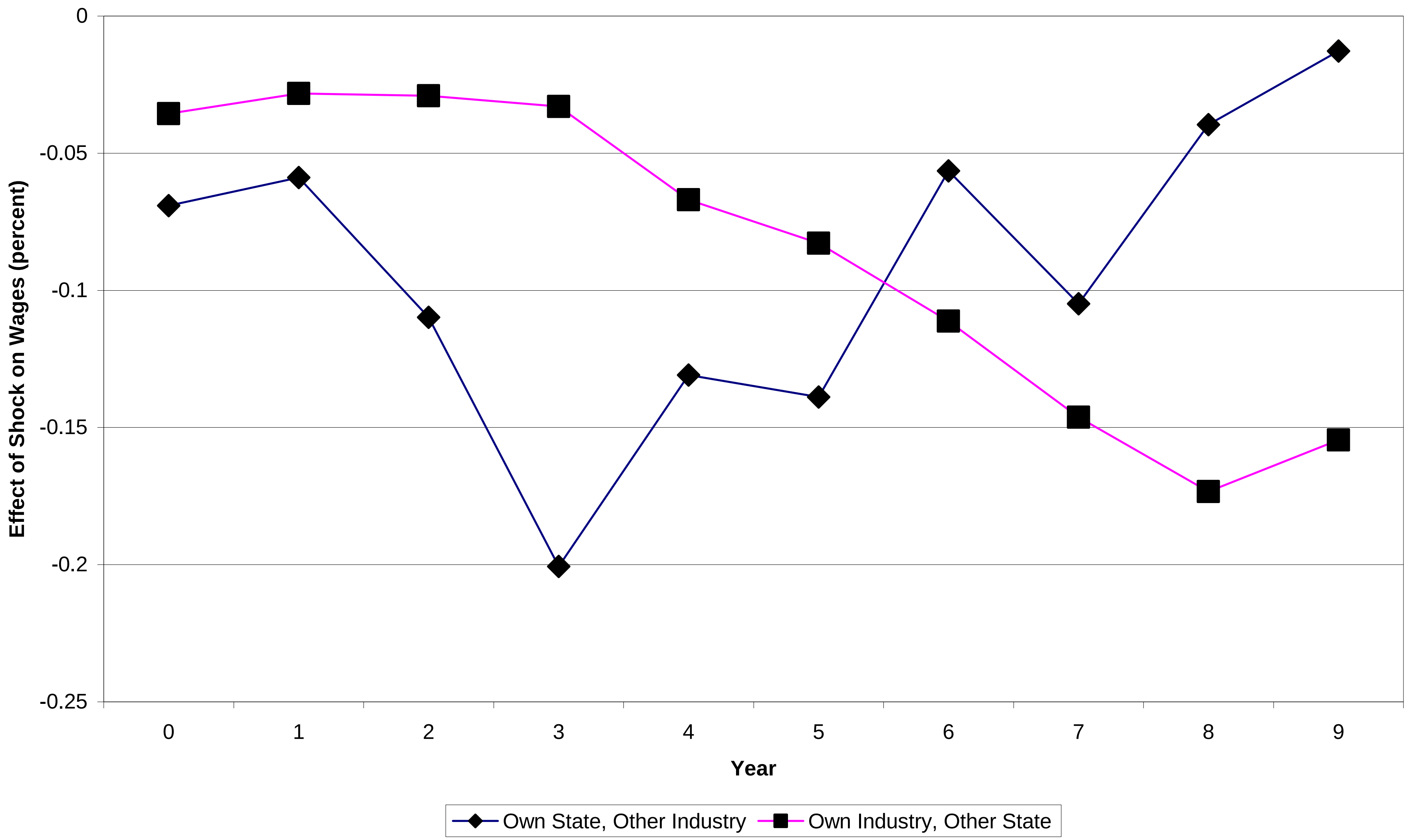


Table 3: Wage Regressions
Log Real Weekly Wages

Variable	1970	1980	1990
INTERCEP	-0.157***	-5.70e-6	-4.70e-6
	(26.00)	(0.013)	(0.012)
BLACK	-0.325***	-0.262***	-0.206***
	(98.55)	(167.20)	(138.81)
HISP	-0.227***	-0.205***	-0.161***
	(33.48)	(107.66)	(118.45)
EXP	0.161***	0.142***	0.155***
	(176.70)	(348.86)	(357.82)
EXP2	-8.28e-3***	-7.39e-3***	-7.72e-3***
	(107.90)	(201.65)	(207.81)
EXP3	1.83e-4***	1.72e-4***	1.74e-4***
	(77.67)	(145.04)	(149.34)
EXP4	-1.49e-6***	-1.50e-6***	-1.50e-6***
	(62.98)	(119.73)	(122.52)
NOHSD	-0.218***	-0.231***	-0.248***
	(91.61)	(189.26)	(205.27)
SOMECOLL	0.109***	0.078***	0.112***
	(38.28)	(68.47)	(113.67)
BA	0.436***	0.359***	0.463***
	(122.51)	(253.57)	(383.99)
ADVDEG	0.485***	0.438***	0.631***
	(103.75)	(249.52)	(411.41)
WEEKWRK	3.27e-3***	5.95e-3***	10.09e-3***
	(26.28)	(118.27)	(223.23)
NONMETRO	-0.101***	-0.090***	-0.108***
	(43.15)	(75.07)	(101.24)
N	406536	2094208	2223036
R^2	0.31	0.30	0.40

Notes: State dummies included. *** indicates significance at the 1% level.

Table 4

Changes in Residual Wage Inequality
(Pooled National Regressions)

	1970		**1980**		**1990**
90-10 Ratio	1.164		1.209		1.282
Change		0.045		0.073	
90-50 Ratio	0.512		0.535		0.582
Change		0.023		0.047	
50-10 Ratio	0.652		0.675		0.701
Change		0.023		0.026	

Changes in Residual Wage Inequality
(Separate State Regressions)

	1970		**1980**		**1990**
90-10 Ratio	1.151		1.202		1.275
Change		0.051		0.073	
90-50 Ratio	0.507		0.531		0.579
Change		0.024		0.048	
50-10 Ratio	0.643		0.671		0.697
Change		0.028		0.026	

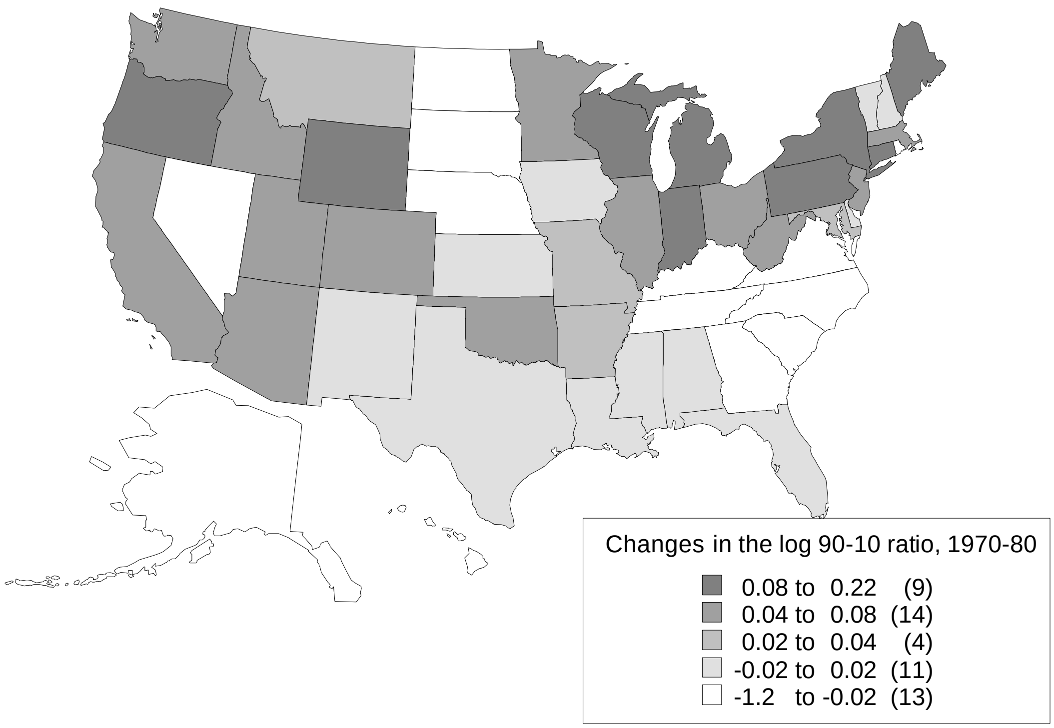
Table 5: Wage Inequality 90 - 10 Differentials
(Residuals from National Level Regressions)

State	1970	State	1980	State	1990
CT	1.01310	NH	1.08611	NH	1.12899
PA	1.02655	RI	1.11204	RI	1.15529
WI	1.04326	CT	1.11629	VT	1.15984
ME	1.04486	PA	1.12144	CT	1.16751
OH	1.05025	OH	1.12743	MD	1.16879
IN	1.05591	WI	1.13308	DE	1.17011
NJ	1.06629	ME	1.13324	VA	1.18657
MA	1.06794	VT	1.13559	NC	1.18868
MI	1.07588	NJ	1.13705	ME	1.19048
OR	1.08399	MA	1.13778	MA	1.19698
IL	1.09182	NC	1.14656	WI	1.212
MN	1.09303	MN	1.15227	SC	1.21238
NH	1.10414	MD	1.15645	IA	1.22263
RI	1.12168	IA	1.16078	NE	1.22336
NY	1.12348	SC	1.162	NJ	1.22705
MD	1.12970	IL	1.16625	PA	1.2311
VT	1.13820	NE	1.16896	OH	1.23172
WY	1.14331	IN	1.17185	SD	1.23475
UT	1.14368	VA	1.17399	KS	1.23572
WA	1.14643	KS	1.17642	GA	1.2473
ID	1.15516	DE	1.18211	WA	1.24785
KS	1.16597	MI	1.19022	IN	1.25021
IA	1.16600	NY	1.20196	AR	1.25295
DE	1.16842	ID	1.20926	MN	1.25504
AR	1.18471	WA	1.21082	ID	1.25917
OK	1.18845	UT	1.21519	TN	1.26158
CO	1.21090	AR	1.22184	AL	1.26277
NE	1.21220	TN	1.22387	HI	1.26464
MO	1.21952	MO	1.2261	ND	1.28276
SC	1.22551	GA	1.23226	IL	1.28486
NC	1.22848	HI	1.2403	MI	1.29513
WV	1.22918	OR	1.24477	CO	1.2965
SD	1.23490	OK	1.24943	UT	1.29686
CA	1.23703	CO	1.25027	MO	1.31029
TN	1.25293	ND	1.25173	OK	1.31197
VA	1.25664	AL	1.2536	MS	1.32043
AL	1.26142	FL	1.27309	KY	1.32224
AZ	1.26375	TX	1.28065	FL	1.32839
MT	1.26999	WV	1.28073	OR	1.32906
TX	1.27554	CA	1.28309	NY	1.33142
FL	1.28121	KY	1.2869	DC	1.33349
DC	1.28421	MT	1.29133	TX	1.34339
GA	1.28618	NV	1.29379	NM	1.35397
NM	1.30236	AZ	1.31669	CA	1.35524
HI	1.30438	NM	1.31818	AZ	1.35716
KY	1.30978	WY	1.32922	NV	1.36228
NV	1.33925	MS	1.32971	WY	1.37519
ND	1.34187	LA	1.37362	WV	1.38325
MS	1.34829	DC	1.37483	MT	1.38571
LA	1.36953	AK	1.60314	LA	1.39944
AK	1.63356	SD	.	AK	1.60416

Table 6: Changes in Wage Inequality 90 - 10 Differentials

State	1970-80	State	1980-90	State	1970-90
ND	**-0.09014**	**DE**	**-0.012**	**VA**	**-0.07007**
VA	**-0.08265**	**MS**	**-0.00928**	**ND**	**-0.05911**
NC	**-0.08192**	**AL**	**0.00917**	**NC**	**-0.0398**
HI	**-0.06409**	**MD**	**0.01234**	**HI**	**-0.03974**
SC	**-0.06351**	**VA**	**0.01258**	**GA**	**-0.03888**
GA	**-0.05391**	**GA**	**0.01504**	**MS**	**-0.02785**
NV	-0.04547	VT	0.02425	SC	-0.01313
NE	-0.04324	HI	0.02435	AL	0.00136
TN	-0.02906	LA	0.02582	DE	0.0017
KY	-0.02288	ND	0.03103	TN	0.00865
MS	-0.01857	AR	0.03111	NE	0.01116
NH	-0.01803	KY	0.03534	KY	0.01246
RI	-0.00963	NM	0.03579	VT	0.02164
FL	-0.00812	WA	0.03704	NV	0.02303
AL	-0.00781	TN	0.03771	NH	0.02484
IA	-0.00522	AZ	0.04047	LA	0.02991
VT	-0.00261	NC	0.04212	RI	0.03361
LA	0.00409	NH	0.04288	MD	0.03908
TX	0.00512	RI	0.04325	FL	0.04718
MO	0.00657	WY	0.04596	NM	0.05161
KS	0.01045	CO	0.04623	IA	0.05663
DE	0.0137	ID	0.04992	TX	0.06786
NM	0.01582	SC	0.05038	AR	0.06824
MT	0.02134	CT	0.05122	KS	0.06975
MD	0.02674	NE	0.0544	CO	0.0856
AR	0.03713	FL	0.0553	MO	0.09076
CO	0.03937	ME	0.05724	AZ	0.09342
CA	0.04607	MA	0.0592	WA	0.10143
WV	0.05156	KS	0.0593	ID	0.10402
AZ	0.05295	IA	0.06185	MT	0.11572
ID	0.0541	OK	0.06254	CA	0.11822
MN	0.05924	TX	0.06274	OK	0.12351
OK	0.06098	NV	0.06849	MA	0.12903
WA	0.06439	CA	0.07215	ME	0.14562
MA	0.06984	IN	0.07837	UT	0.15318
NJ	0.07076	WI	0.07892	WV	0.15407
UT	0.07151	UT	0.08167	CT	0.1544
IL	0.07443	MO	0.08419	NJ	0.16076
OH	0.07718	OR	0.08429	MN	0.16202
NY	0.07848	NJ	0.09	WI	0.16874
ME	0.08838	MT	0.09438	OH	0.18147
WI	0.08982	WV	0.10251	IL	0.19304
PA	**0.09489**	**MN**	**0.10278**	**IN**	**0.1943**
CT	**0.10318**	**OH**	**0.10429**	**PA**	**0.20455**
MI	**0.11434**	**MI**	**0.10491**	**NY**	**0.20794**
IN	**0.11593**	**PA**	**0.10966**	**MI**	**0.21925**
OR	**0.16078**	**IL**	**0.11861**	**WY**	**0.23188**
WY	**0.18592**	**NY**	**0.12946**	**OR**	**0.24507**

Figure 6: Changes in Inequality



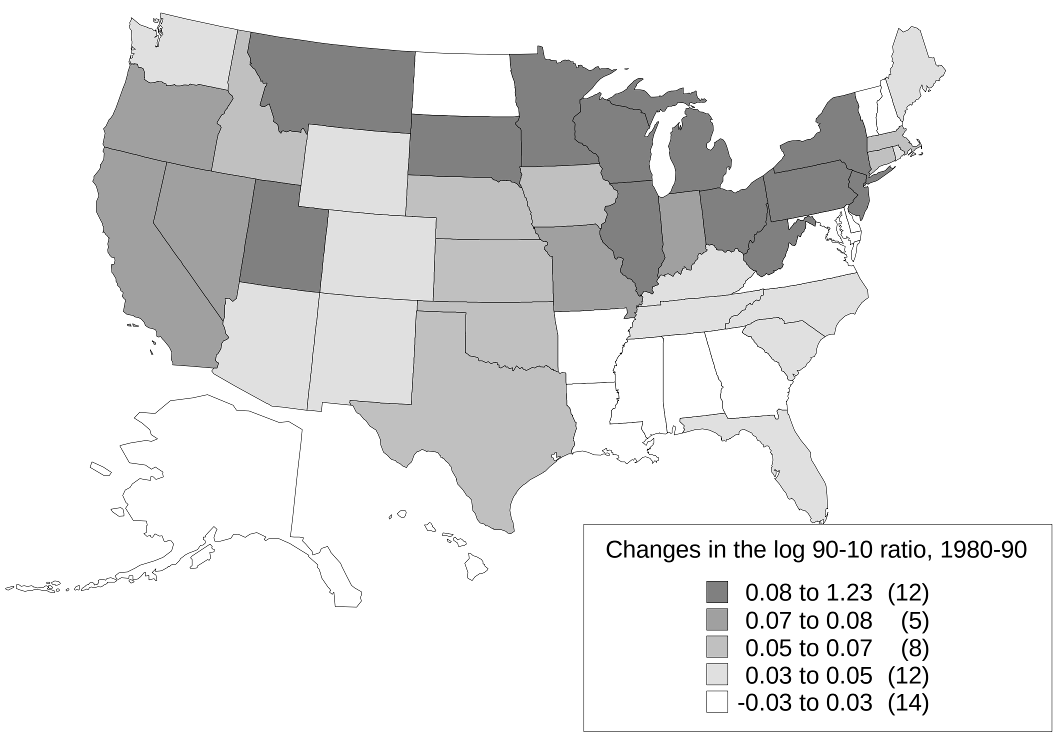


Figure 7
Persistence in Inequality Changes

Table 7

Impact of States with Largest and Smallest Inequality Increases

	90-10 Difference (Levels)		
	1970	1980	1990
All States	1.164	1.210	1.282
Excluding 6 Small	1.154	1.209	1.289
Excluding 6 Large	1.204	1.228	1.285

	90-10 Difference (Changes)	
All States	0.046	0.073
Excluding 6 Smallest	0.055	0.080
Excluding 6 Largest	0.025	0.056

Table 8

Mean Reversion in State Residual Wage Inequality

Dep. Var.:	Inequality Change, 1970-1980		Inequality Change, 1980-1990	
	Coefficient	t Stat	Coefficient	t Stat
Intercept	0.536	6.406	0.241	2.928
Initial Inequality	-0.428	-6.083	-0.154	-2.272
R^2	0.429		0.080	
N	49		49	

Table 9
Explaining Changes in State Residual Wage Inequality

Dependent Variable: log (state 90-10 ratio)
(residuals from log wage regression)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Durable	-1.583***									
	(0.247)									
Machine		0.098***								
		(0.019)								
Computer			0.031***							
			(0.005)							
Import				0.354***						
				(0.088)						
Export					0.022					
					(0.104)					
Union						-0.007***				
						(0.001)				
Minwage							-0.162***			
							(0.018)			
Immigrant								2.274**		
								(1.153)		
Procure									-0.024***	
									(0.005)	
Cycle										-0.222**
										(0.107)
R^2	0.29	0.21	0.42[+]	0.14	0.00	0.29	0.45	0.04	0.18	0.04
N	149	149	99	149	149	149	149	149	149	149

All regressions were estimated using state fixed effects. *** indicates significance at the 1% level. ** indicates significance at the 5% level. * indicates significance at the 10% level. South Dakota is missing from the population census for 1980 and Hawaii is missing in all years from the LRD. Standard errors are given in parentheses. [+] The computer numbers are not available for 1970.

Table 10
Explaining Changes in State Residual Wage Inequality
(with year dummies)
Dependent Variable: log (state 90-10 ratio)
(residuals from log wage regression)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Durable	-1.047***									
	(0.007)									
Machine		-0.033								
		(0.028)								
Computer			-0.001							
			(0.007)							
Import				-0.012						
				(0.140)						
Export					-0.311**					
					(0.145)					
Union						-0.002				
Minwage							-0.142			
							(0.100)			
Immigrant								-1.179		
								1.03)		
Procure									0.002	
									(0.012)	
Cycle										-0.229***
										(0.080)
R^2	0.55	0.45	0.67+	0.45	0.48	0.45	0.46	0.45	0.45	0.48
N	149	149	99	149	149	149	149	149	149	149

All regressions were estimated using state fixed effects and time dummies. *** indicates significance at the 1% level. ** indicates significance at the 5% level. * indicates significance at the 10% level. South Dakota is missing from the population census for 1980 and Hawaii is missing in all years from the LRD. Standard errors are in parentheses. + The computer numbers are not available for 1970.

Table 11
Explaining Changes in State Residual Wage Inequality

Dependent Variable: log (state 90-10 ratio)
(residuals from log wage regression)

	(1)	(2)	(3)	(4)
Durable	-1.175***	-1.217***	-0.803***	-0.698***
	(0.224)	(0.228)	(0.238)	(0.243)
Machine	-0.001	-0.011	0.014	-0.009
	(0.024)	(0.025)	(0.027)	(0.030)
Import	-0.011	-0.168	0.259*	0.326**
	(0.114)	(0.139)	(0.144)	(0.148)
Export	0.039	-0.106	0.011	0.005
	(0.121)	(0.140)	(0.109)	(0.108)
Union	0.000	0.000	0.001	0.003
	(0.002)	(0.002)	(0.002)	(0.002)
Minwage	-0.139***	-0.087	-0.151***	-0.045
	(0.031)	(0.095)	(0.042)	(0.079)
Immigrant	-0.198	-0.444	-0.338	-0.837
	(0.911)	(0.932)	(1.307)	(1.322)
Procure	-0.002	0.012	0.010	0.009
	(0.009)	(0.011)	(0.011)	(0.011)
Cycle	-0.255***	-0.217***	-0.267**	-0.312***
	(0.075)	(0.079)	(0.100)	(0.103)
Time dummies		X		X
R^2	0.64	0.65	0.81	0.82
N	149	149	99	99

All regressions were estimated using state fixed effects and time dummies. *** indicates significance at the 1% level. ** indicates significance at the 5% level. * indicates significance at the 10% level. South Dakota is missing from the population census for 1980 and Hawaii is missing in all years from the LRD. Standard errors are in parentheses.

Table 12: Explaining Changes in State Residual Wage Inequality

Dependent Variables:
log (state 90-50 ratio) [columns 1,2]
log (state 50-10 ratio) [columns 3,4]
(residuals from log wage regression)

	(1)	(2)	(3)	(4)
Durable	-0.370***	-0.341***	-0.805***	-0.875***
	(0.101)	(0.103)	(0.185)	(0.189)
Machine	-0.004	-0.011	0.003	0.00
	(0.011)	(0.011)	(0.020)	(0.021)
Import	-0.085*	-0.112*	0.074	-0.056
	(0.051)	(0.063)	(0.094)	(0.115)
Export	0.127**	0.085	-0.088	-0.192
	(0.055)	(0.063)	(0.099)	(0.116)
Union	-0.000	-0.000	0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Minwage	-0.112***	-0.032	0.026	-0.055
	(0.014)	(0.043)	(0.026)	(0.078)
Immigrant	1.261***	1.041**	-1.459*	-1.485*
	(0.412)	(0.421)	(0.754)	(0.771)
Procure	0.001	0.004	-0.002	0.008
	(0.005)	(0.005)	(0.007)	(0.009)
Cycle	-0.017	-0.022	-0.238***	-0.194***
	(0.034)	(0.036)	(0.062)	(0.065)
Time dummies		X		X
R^2	0.79	0.80	0.39	0.42
N	149	149	149	149

All regressions were estimated using state fixed effects. *** indicates significance at the 1% level. ** indicates significance at the 5% level. * indicates significance at the 10% level. South Dakota is missing from the population census for 1980 and Hawaii is missing in all years from the LRD.