



The Review of Regional Studies

The Official Journal of the Southern Regional Science Association



Unionization and Convergence in the United States*

John Meszaros

United States Postal Service, USA

Abstract: Using data on U.S. state-level unionization from Hirsch et al. (2001) and the club convergence test developed by Phillips and Sul (2007, 2009), this paper shows that U.S. states have distinct groupings in terms of the level of unionization. In particular, the states in the American South generally belong to their own low union density groups. Further, states in the Northeast (such as New York) and the Great Lakes region (Michigan, Ohio) tend to have high levels of unionization and form their own convergence clubs.

Keywords: labor unions, convergence clubs

JEL Codes: C50, J50

1. INTRODUCTION

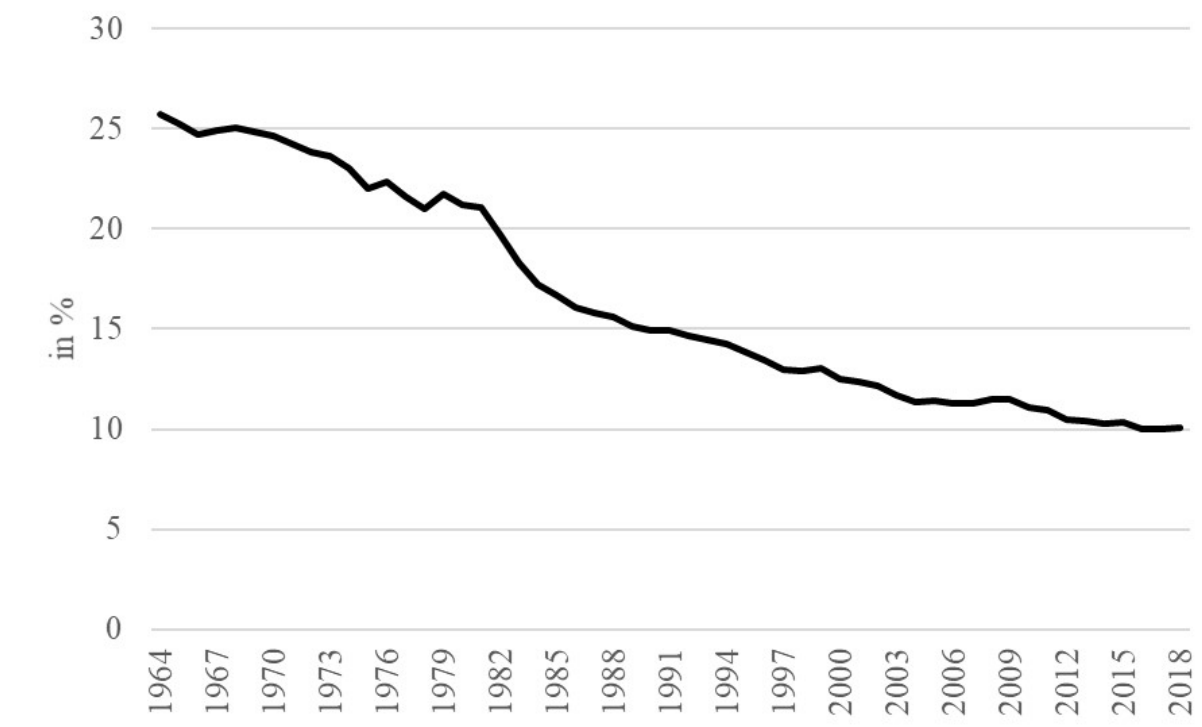
Labor union density in the United States has changed dramatically over the last few decades. Figure 1 shows the evolution of union density in the U.S. from 1964 to 2018.¹ Clearly, there has been a significant overall decline since the late 1960s. This was not always the case, however, as there was a distinct rise (from the 1930s to 1950s) and a distinct fall from the 1960s to the present (see Brennan (2016) p. 29 for a detailed discussion of historical union density in the U.S.). Further, although labor union membership has declined consistently across the U.S., it is likely that, for historical or political reasons, certain areas of the country may be reacting differently to the changing political and global economic environment. There is at least visual evidence for this in Figure 2.

As seen in Figure 2, the states in the American South, such as Texas, Florida, and South Carolina, and states in the Great Plains, like South Dakota, have low levels of unionization compared to states in the Northeast and Great Lakes region, such as New York, Michigan,

*Disclaimer: This research was prepared by the author in his personal capacity. The opinions expressed in this article are the author's own and do not necessarily reflect the views of the United States Postal Service or the United States government. Acknowledgements: I would like to thank the editor, Amanda Ross, and an anonymous referee for helpful and substantial comments which improved the paper. I would also like to thank Ed Berisha for helpful comments and Lei Zhang for her editorial help.

John Meszaros is a Financial Economist at the United States Postal Service, Washington, DC. E-mail: john.meszaros@yahoo.com

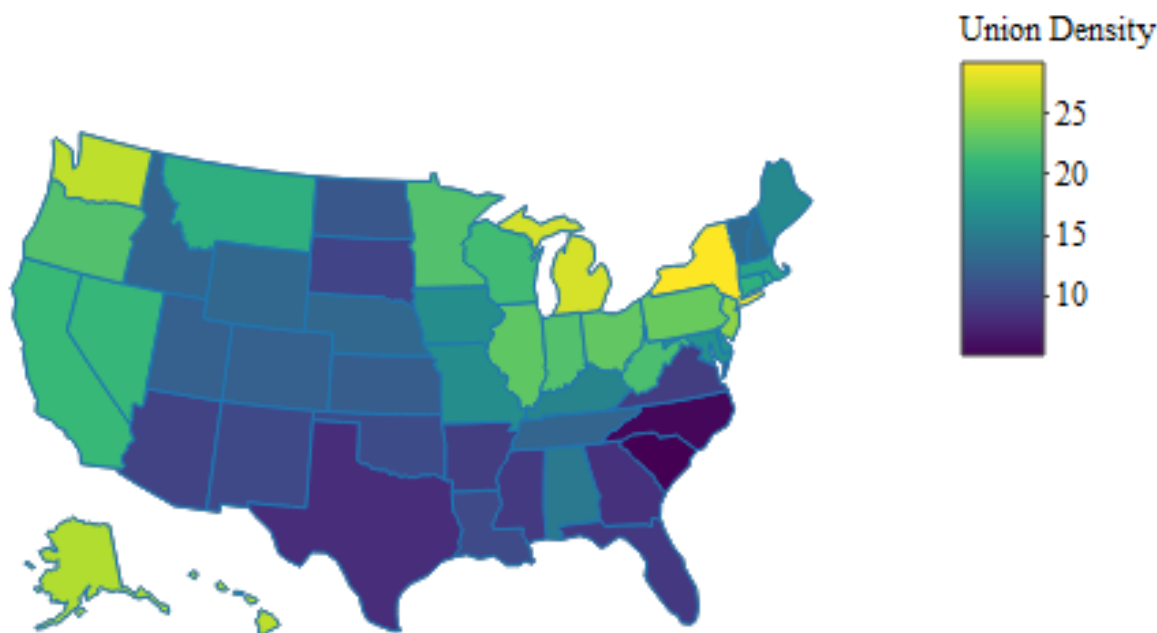
¹Percentage of nonagricultural wage and salary employees who are union members, including employees in the public sector.

Figure 1: Total Union Density in the United States

Note: This figure shows total union density in the United States: Cross-sectional means of all 50 states from 1964-2018 using Hirsch et al. (2001) data. Data is percentage of nonagricultural wage and salary employees who are union members, including employees in the public sector.

and New Jersey. This indicates that there may be a regional “flavor” to political and public support for union activity. In addition, Devinatz (2015) argues that the U.S. has become “Southernized,” meaning the cultural and economic practices of the American South have spread to the rest of the country since the 1980s. In particular, Devinatz highlights the spreading enactment of right-to-work laws. Thus, it is possible that the entire U.S. is moving toward a low unionization regime. In terms of the regional economics literature, unionization is important as it has been shown to impact productivity and economic growth (Gruben and Phillips, 1990; Pantuosco et al., 2002). Further, unions have been shown to affect unemployment and employment growth in states (Grimes and Ray, 1988; Partridge and Rickman, 1995; Walden, 2012).

Recently, authors such as Holmes et al. (2019) and Herndon (2020) have used convergence methods to classify local and regional product and housing price groups. These methods are useful for classifying and showing regional “clubs” and convergence or divergence among groups of states, counties, or countries. Given this background, this paper investigates if the U.S. is converging as a whole to a low union density regime or if there are specific groups of states with low (or high) levels of unionization that exist due to cultural and historical reasons. To test this, this paper will apply the club convergence method of Phillips and Sul (2007, 2009). This will expand on some of the past qualitative literature on unions and shed light on possible groups of states with high or low union membership. This method,

Figure 2: Average Union Density in the U.S. from 1964-2018

Note: Union density is the percentage of nonagricultural wage and salary employees who are union members, including employees in the public sector. Data from unionstats.com.

especially since it has been recently programmed in R by Sichera and Pizzuto (2019), can be extremely useful to regional economists who may want to test conjectures about convergence among regions or test for groups of regions. The method can easily be adapted to investigate convergence or grouping questions across a variety of topics (for example: unionization levels, house prices, product prices, mortality rates).

To preview the results, states in the American South generally belong to low union density groups. However, there are a few surprises, such as Alabama, which is a “Deep South” state in a moderate union density group. Alabama has an interesting past which will be discussed further in the results section. Also, Alaska, Hawaii, and New York form a high union density group. This (rather unlikely) group of states share some interesting characteristics that will also be detailed further in the results section.

The rest of the paper is structured as follows. Section 2 provides a brief review of the union literature. Section 3 covers the data and method. Section 4 presents the results and section 5 concludes.

2. LITERATURE REVIEW AND BACKGROUND ON UNIONS

As mentioned in the introduction, unionization in the U.S. underwent significant changes in the 20th century. Prior to the New Deal era, there was significant political opposition to unions, and union density was quite low. Griffin et al. (1986) document the extent to

which corporations and corporate-friendly organizations went to combat the rise of the labor movement in the U.S. However, after Congress passed the National Labor Relations Act in 1935, unions were legally recognized at the national level. Following this, as documented in Brennan (2016), labor unions grew dramatically from the 1930s until roughly the mid-1960s.

However, not all areas of the U.S. were receptive to union organizing. The former Confederate states (the South) were particularly hostile areas. Acharya et al. (2016) show that past incidence of slavery created a more conservative political environment in the American South (states that were part of the Confederate States of America during the U.S. Civil War).² Farhang and Katznelson (2005) reinforce this and note that southern Democrats began to oppose labor unions in the 1940s and 1950s as they saw labor unions as a challenge to the South's political order (in particular the policies of racial discrimination as some unions were supportive of civil rights measures).³ Further, Hogler et al. (2015) argue that the American South has lower levels of social trust, lower levels of unionization, and, consequently, higher levels of inequality. They argue that this is a cultural phenomenon resulting from the slave-holding past of the South. Hogler and Henle (2011) make a similar argument. Jacobs and Dixon (2006) also note that states, particularly in the South, that had more racial division, more small businesses, and more conservative citizens were more receptive to right-to-work legislation and were generally more opposed to unions. Stelzner (2019) also describes how legal institutions in the South were particularly hostile to labor organizing.

Further, Shermer (2009) examines labor legislation in the U.S. post-World War II. She highlights the differences between the "Old South" (states that were in the Confederate States of America), states in the American West, and the rest of the states. In the "Old South," anti-union sentiment was present, according to Shermer, because the region was reluctant to abandon its racial politics and unions threatened the dominant position of the agricultural elite. In the American West, anti-union sentiment was driven by the belief that unions would slow economic dynamism and that unions fostered corruption and graft. In any case, the regions were more strongly opposed to unionization than other regions in the nation. Like Shermer (2009), Friedman (2000) also highlights that governments in the South were reluctant to support unions as they threatened the South's political and social order. Overall, the past literature clearly documents differences between the South and the West compared to the rest of the U.S. in terms of institutions and receptiveness to labor organizing.

Finally, in the past 30 years, right-to-work legislation and other political activity has pushed union membership down across the entire U.S. Stelzner (2017) details the institutional changes in the National Labor Relations Board (NLRB) since the 1980s that have negatively impacted unions' organizing ability. Stelzner highlights the breaking of the PATCO strike in the 1980s by President Reagan as a pivotal moment. Tope and Jacobs (2009) also argue

²Peisakhin (2015) also details how past institutions can shape the present day by showing how a long-abandoned border between the Austrian and Russian empires still influences pro- or anti-Russian sentiment today in the Ukraine. The states that seceded from the U.S. (the Confederate States of America) are: Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, Virginia.

³Dixon (2007) presents a detailed study of post-World War II Texas. He shows how, from initially promising results gained during the war, the labor movement was relatively unsuccessful in becoming a prominent player in Texas's political and economic environment.

that politics (mainly the change in a broad range of labor policies under President Reagan) drove the decline in unionization in the U.S. Lastly, Hogler et al. (2004), controlling for a variety of social and political factors, show that right-to-work laws significantly reduce union membership and are not merely an indicator of prior anti-union sentiment. More recently, the *Janus vs. AFSCME* ruling seems likely to further reduce union organizing and membership, particularly in the public sector. Taken together, increased political opposition and right-to-work legislation has led to near continuous decreases in national union density since the late 1960s.

3. DATA AND METHOD

3.1. Data

The union data comes from Barry Hirsch and David Macpherson's website: unionstats.com. The specific measure used in the analysis is union density by state, which is the percentage of nonagricultural wage and salary employees who are union members, including employees in the public sector. See Hirsch et al. (2001) for more information on how the data was constructed. The data covers the years 1964-2018. In addition, the series for each state are smoothed using the Hodrick-Prescott filter (Hodrick and Prescott (1997)) to avoid any business cycle fluctuations (as suggested by Phillips and Sul (2009)). It would be beneficial to analyze a longer time period, but, unfortunately, as far as the author is aware, there are not measures of union density at the state level that pre-date 1964. It would be valuable to do a similar analysis over a longer historical period if state-level data does become available in the future for years prior to 1964 (this would be an excellent area for further data development).

3.2. Method

Phillips and Sul (2007, 2009) developed a technique to identify what they call convergence clubs. Their test determines whether various countries (or states) converge to a common factor.⁴ If this occurs, the states are said to converge. Phillips and Sul's *log t* test examines an individual state's transition path over time compared to the common growth component amongst the larger group. The sketch of the method detailed below is adopted directly from Montañés and Olmos (2013) and Regis et al. (2015). The transition coefficient $h_{it} = \frac{ud_{it}}{\overline{ud}_t}$ takes the original variable of interest (here union density) for each state and compares it to the cross-section average of union density \overline{ud}_t (see Regis et al. (2015)). The *log t* test takes a transformation of the cross-section variance $h_{it}(\sigma_{ht}^2)$ and regresses it against $\log(t)$. If h_{it} approaches 1 as time passes, then σ_{ht}^2 approaches 0 and there is evidence for convergence amongst the group. The specification of the *log t* test, as shown in Regis et al. (2015), is presented below:

⁴The method has been applied to a variety of economic questions including housing prices (Holmes et al., 2019), inequality (Apergis et al., 2018), and economic growth (Li et al., 2018) amongst many other applications.

$$\log \left(\frac{\sigma_{h1}^2}{\sigma_{ht}^2} \right) - 2 \log [\log (t)] = a + \gamma \cdot \log (t) + u_t \quad (1)$$

In equation 1, convergence occurs when γ is positive.⁵ Further, Phillips and Sul (2009) created a clustering algorithm to detect convergence clubs. Recently, Sichera and Pizzuto (2019) adapted Phillips and Sul's method for use in R. See Appendix 1 for a detailed description of the club selection method. This paper makes use of the method developed by Phillips and Sul (2007, 2009) and programmed in R by Sichera and Pizzuto (2019). The availability of the Sichera and Pizzuto package in R for free gives this method great research potential for regional economists.

4. RESULTS

4.1. Main Results

First, global convergence tests of all 50 states returned a $\hat{\gamma}$ of -1.26 with a t-statistic of -93.6, strongly indicating divergence of unionization levels considering the U.S. as a whole.⁶ As such, the paper proceeds using the club convergence method to test for specific groupings of states regarding unionization.

Next, initial club convergence tests were run. The main results make use of the fixed quadratic spectral bandwidth (FQSB) method with a time trim of 1/3rd. FQSB is the default method to select the bandwidth and Phillips and Sul (2009) suggest the 1/3rd time trim. As such, this is the primary method used in the paper. Alternate estimations are shown in Appendix 2. In order to save space, intermediate results are not shown.⁷ Instead, the final convergence results are shown (after clubs have been merged). Table 1 shows the final convergence club results.

As seen in table 1, Alaska, Hawaii, and New York form their own high unionization group. The rest of the states group together along roughly regional lines with the Great Lakes, Northeast, and West Coast states in higher union density groups and the South and Great Plains states generally in mid to low-level unionization groups. Notice there are a few unusual states such as Alabama (in the Deep South but with a moderate level of unionization) and Utah (in the West but with very low levels of unionization). Figure 3 shows a map of the clubs.

⁵In equation 1, the magnitude of γ measures the specific type of convergence. If $\gamma \geq 2$, this indicates that, if the common growth component follows a random walk with drift or a trend stationary process, the groups are converging in levels. If $2 > \gamma \geq 0$, this implies conditional convergence, namely a convergence in growth rates (Phillips and Sul, 2009).

⁶Alternate specifications using a slightly smaller time trim (1/5th of observations) also showed strong evidence for divergence of union density levels across the U.S. states.

⁷These results are available upon request.

Table 1: Convergence Club Results with Fixed Quadratic Spectral Bandwidth and Time Trim of 1/3rd of Values

Final Club Classifications			
Clubs	States	Gamma	T-stat
Club 1	Hawaii, Alaska, New York	0.84	4.40
Club 2	Connecticut, Rhode Island, Washington, New Jersey, Illinois, Michigan, Vermont	0.48	3.34
Club 3	California, Minnesota, New Hampshire, Nevada, Massachusetts, Ohio, Pennsylvania, Montana, Oregon, Maine, West Virginia, Maryland, Colorado	-0.06	-0.56
Club 4	Delaware, Kentucky, Indiana, Alabama, Missouri, Iowa, Kansas, Wisconsin, Nebraska, New Mexico, Florida, Arizona	0.06	0.63
Club 5	Wyoming, Oklahoma, South Dakota, Idaho, Mississippi, North Dakota, Louisiana, Texas	0.46	3.98
Club 6	Tennessee, Arkansas, Virginia, Georgia, Utah, North Carolina, South Carolina	0.35	3.92

Note: Using time trim of 1/3rd of values and fixed quadratic spectral bandwidth method.

4.2. Discussion of Results

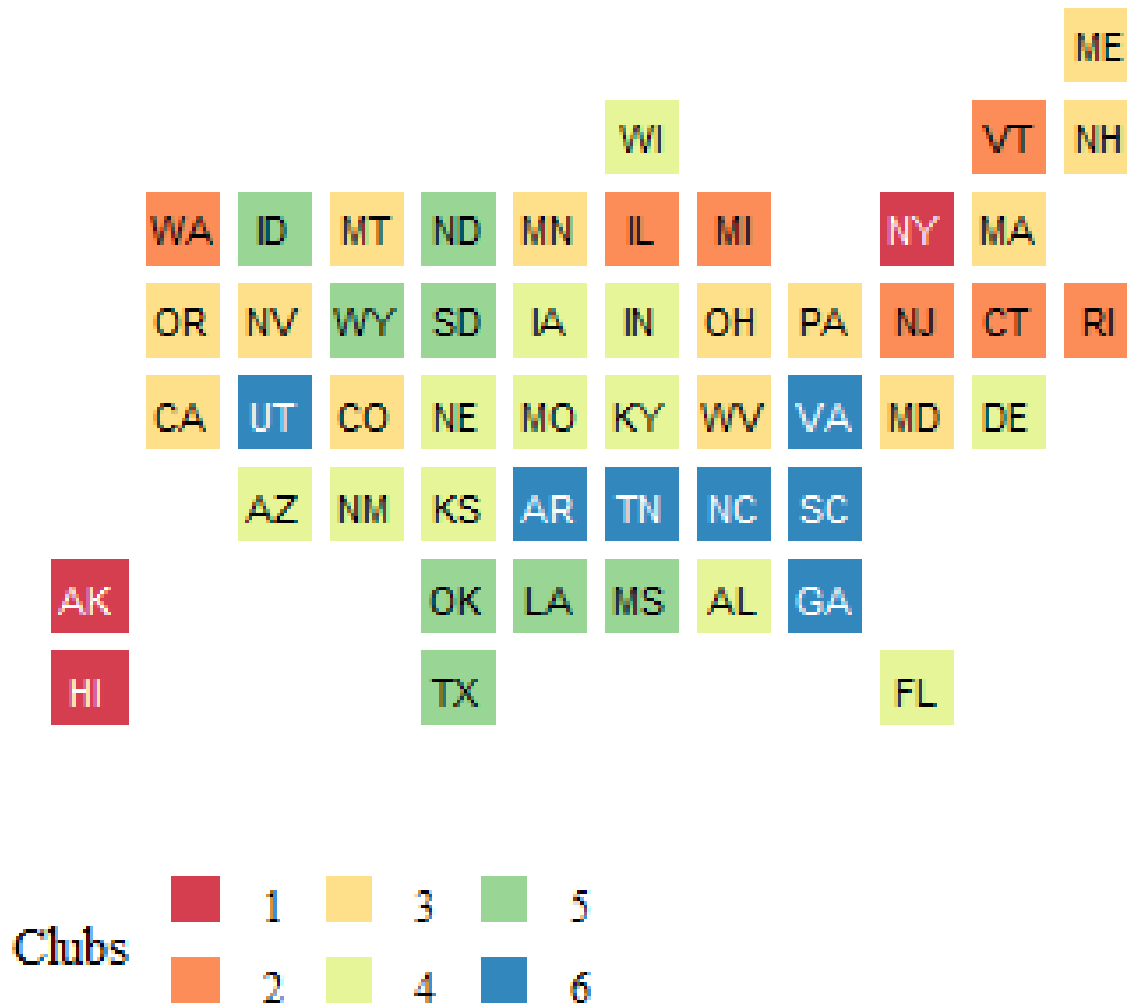
As detailed above, the method of Phillips and Sul (2007) demonstrates that the U.S. does not show convergent behavior across all states in terms of union density. In fact, the results show that the U.S. has distinct regional groupings in terms of union density although union density has steadily declined since the late 1960s. For illustration, Figure 4 shows the average union density across the clubs from 1964 to 2018 (with clubs from the FQSB, 1/3rd time trim estimation).

As seen in Figure 4, union density has almost continually declined over the sample period. However, notice that the clubs are relatively distinct in their density levels. Note that clear regional differences stand out. Recall in the literature review that the South was described as qualitatively different than the rest of the U.S. This can be observed in the figures as the states that were in the Confederate States of America are grouped in the lowest or second lowest groups (excluding Alabama which is an unusual exception). These results corroborate the discussions in Friedman (2000), Farhang and Katznelson (2005), Jacobs and Dixon (2006), Shermer (2009), Hogler et al. (2015). The above authors all note that the South had a distinct political order (i.e. the policies of racial discrimination), that the South had more conservative citizens disinclined to support labor unions and lower levels of social trust that made it more difficult to organize labor unions.

4.3. Unusual States

As noted, Alaska, Hawaii, and New York form the club with the highest union density. This seems to be an unusual group, but, with a little deeper dive into the underlying data, some

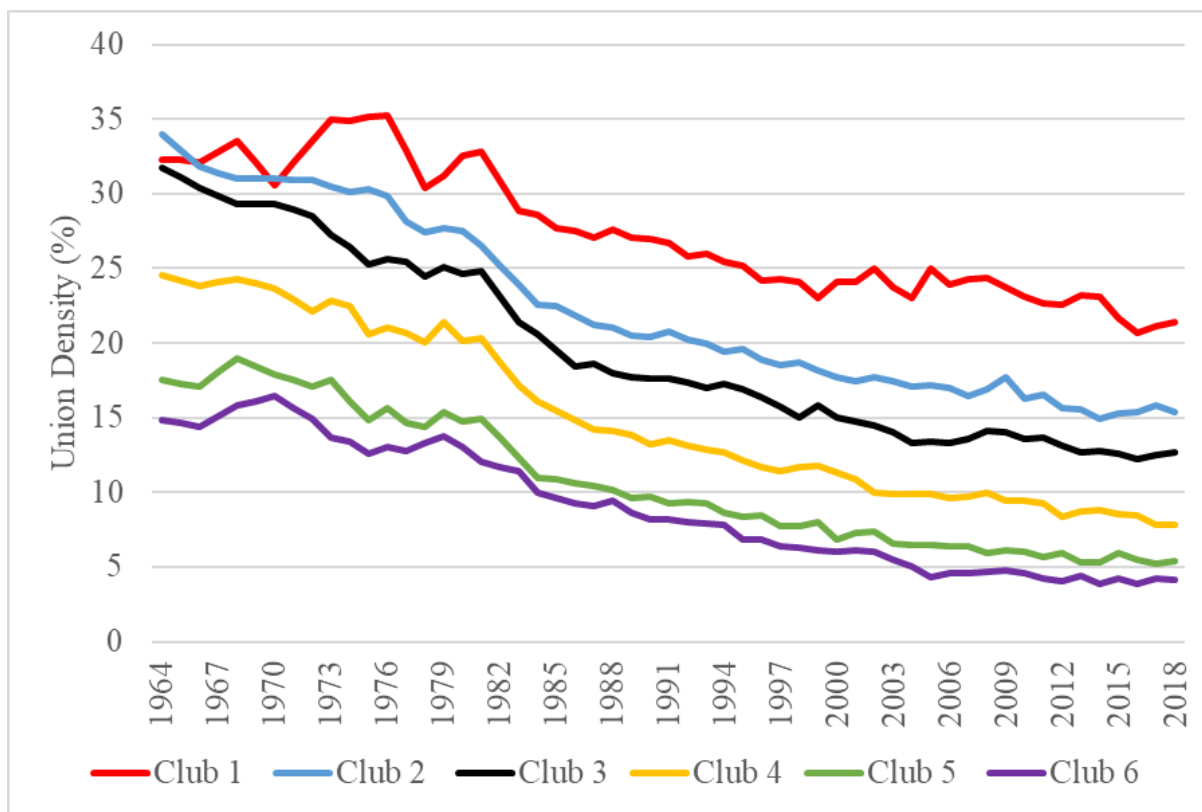
Figure 3: Clubs Mapped from Table 1



interesting commonalities surface. Tables 2 and 3 show public sector and manufacturing employment as a percentage of total employment for selected states and for the U.S. as a whole. The tables also show the percentage of workers that are in unions for the selected states and sectors.

Notice that Alaska, Hawaii, and New York all have above average public sector employment with Alaska having the highest of the group. Alaska and Hawaii have unique geographies that create more need for public transportation and natural resource workers, driving their relatively high public sector share of employment.⁸ As is known, public sector unionization has been relatively strong (at least up to the Janus vs. AFSCME ruling). New York, in particular, has very high union density levels in the public sector. This is likely due to large numbers of highly unionized public service employees in New York City (police, firefighters, transit workers, and so on). Alaska and Hawaii also have membership well above the national average. These factors (high share of public employment with strong union

⁸See the discussion at <http://www.hawaiireporter.com/287618/>.

Figure 4: Average Union Density by Club

Note: This figure shows average union density by club (with clubs from fixed quadratic spectral bandwidth and time trim of 1/3rd of values).

representation amongst these workers) contribute to the highest union density club.

Two other states stand out: Alabama and Utah. Alabama is a state in the “Deep South” but it has a relatively moderate level of unionization. As seen in Table 3, Alabama has higher than average employment in the manufacturing sector. Although Alabama’s rate of unionization in the manufacturing sector is slightly below average (in the past 15 years or so) the historical size of the sector pushes Alabama as a whole into the middle-density clubs. This has a historical background as Melcher and Goldfield (2019) note that union density was relatively high near Birmingham due to high levels of union organization by coal miners in the region. Organized shipbuilders and longshoremen in Mobile also contributed to Alabama’s (relatively) high union density. This historical union presence has continued into the present by pushing Alabama out of the “Deep South” low union density clubs. Utah, on the other hand, is in the West where union density is typically somewhat higher. However, Utah is classified in the “Deep South” club. Utah has average public sector employment but, as seen in Table 2, public sector union membership is very low. Utah also has slightly higher than average manufacturing employment, but, again, the level of union organization in the sector is very, very low. There is no specific reason that the author could find regarding this low-level of unionization, so this is certainly an area for future research for a labor historian

Table 2: Public Sector Employment and Union Membership

Public Sector Employment as % of Total Employment									
	1983	1985	1990	1995	2000	2005	2010	2015	2018
Alabama	19.3%	20.1%	18.4%	16.8%	16.1%	17.0%	19.1%	16.7%	17.1%
Alaska	31.3%	30.2%	30.7%	35.3%	29.8%	27.4%	26.5%	27.4%	27.0%
Hawaii	24.6%	25.2%	22.5%	22.5%	22.2%	21.8%	20.2%	21.9%	21.4%
New York	18.8%	19.5%	19.6%	19.3%	18.4%	18.9%	18.6%	16.6%	17.0%
South Dakota	23.8%	22.3%	21.3%	19.1%	18.8%	18.2%	17.7%	16.4%	15.5%
Utah	20.8%	21.8%	20.8%	20.0%	16.7%	16.8%	19.4%	16.1%	15.5%
United States	17.7%	17.0%	17.1%	16.7%	15.7%	16.2%	17.0%	15.4%	15.1%
Public Sector Union Membership (%)									
	1983	1985	1990	1995	2000	2005	2010	2015	2018
Alabama	23.5%	24.3%	20.4%	30.5%	29.6%	30.9%	28.9%	33.8%	24.9%
Alaska	41.6%	43.3%	43.6%	44.5%	43.3%	48.5%	55.4%	41.8%	44.0%
Hawaii	51.6%	51.9%	55.7%	54.2%	61.7%	57.7%	50.2%	50.0%	52.6%
New York	69.3%	66.7%	69.4%	70.1%	70.6%	68.9%	70.5%	68.6%	66.6%
South Dakota	22.6%	24.0%	22.3%	21.1%	18.5%	19.9%	17.9%	22.8%	20.0%
Utah	30.3%	23.5%	24.9%	28.0%	21.6%	15.7%	17.5%	12.5%	13.1%
United States	36.7%	35.7%	36.5%	37.7%	37.5%	36.5%	36.2%	35.2%	33.9%

Note: Information in tables are calculated using data from Hirsch and Macpherson's website unionstats.com

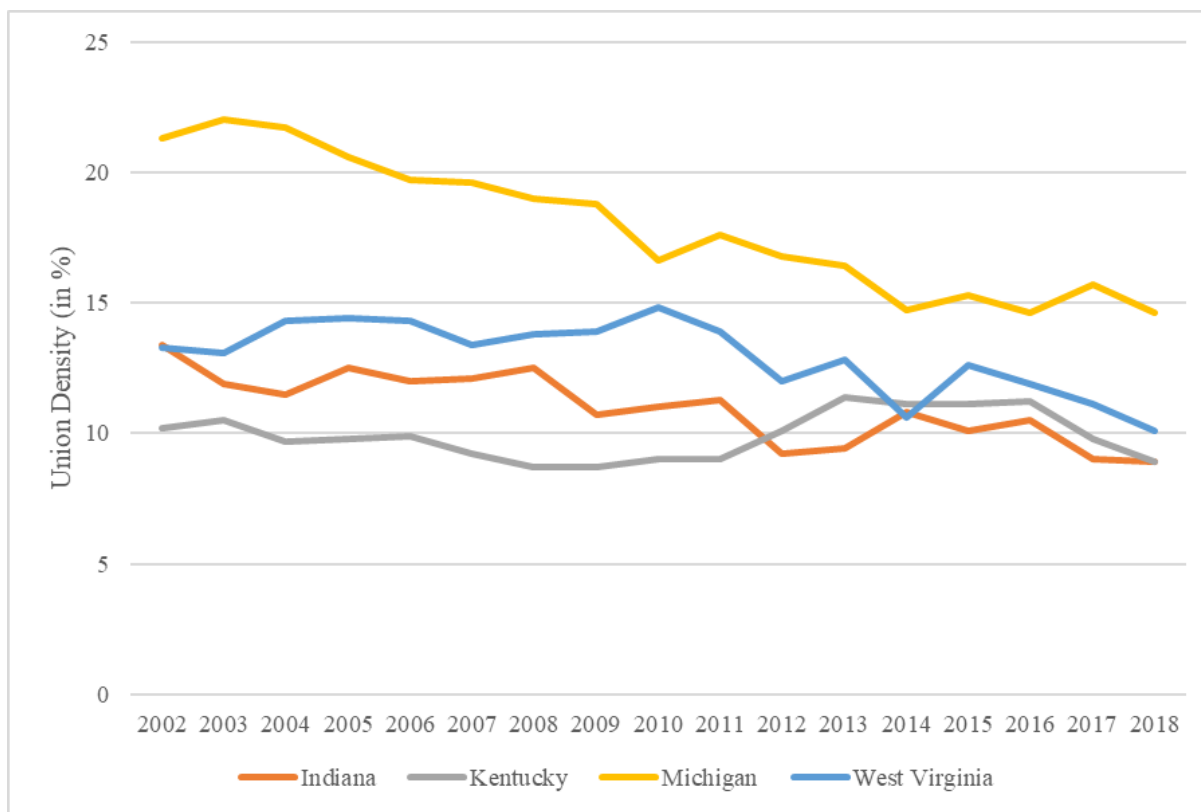
Table 3: Manufacturing Sector Employment and Union Membership

Manufacturing Sector Employment as % of Total Employment									
	1983	1985	1990	1995	2000	2005	2010	2015	2018
Alabama	25.8%	24.9%	26.3%	25.1%	19.8%	16.9%	13.6%	17.1%	16.4%
Alaska	6.1%	5.9%	4.5%	3.1%	3.5%	2.3%	2.5%	3.3%	2.3%
Hawaii	6.4%	5.5%	5.3%	2.8%	4.2%	2.9%	2.3%	2.3%	2.2%
New York	19.9%	18.8%	16.1%	14.4%	11.8%	7.9%	6.6%	6.5%	6.0%
South Dakota	11.7%	11.7%	12.2%	15.7%	13.0%	11.6%	11.7%	12.8%	13.6%
Utah	14.9%	15.7%	17.3%	16.2%	13.6%	10.6%	10.5%	12.3%	11.4%
United States	21.6%	21.3%	19.6%	17.7%	15.9%	12.3%	10.7%	10.9%	10.6%
Manufacturing Sector Union Membership (%)									
	1983	1985	1990	1995	2000	2005	2010	2015	2018
Alabama	25.9%	25.2%	22.1%	19.5%	14.4%	12.1%	13.0%	7.7%	7.2%
Alaska	23.3%	18.9%	31.1%	3.8%	11.8%	7.7%	2.8%	3.7%	8.7%
Hawaii	35.6%	34.8%	40.5%	11.0%	11.6%	19.5%	13.3%	6.7%	10.7%
New York	31.0%	28.7%	25.3%	22.5%	19.9%	16.4%	15.3%	10.7%	10.8%
South Dakota	19.0%	19.3%	10.4%	9.1%	5.2%	5.4%	7.6%	5.0%	3.3%
Utah	14.9%	8.6%	4.8%	4.1%	5.8%	1.8%	6.0%	1.1%	2.8%
United States	27.8%	24.8%	20.6%	17.6%	14.8%	13.0%	10.7%	9.4%	9.0%

Note: Information in tables are calculated using data from Hirsch and Macpherson's website unionstats.com

or labor economist.⁹

⁹The low union density levels may be driven by the very strong connection of residents to the Mormon faith supplanting other means of social connection such as unions. This explanation is just conjecture by the author.

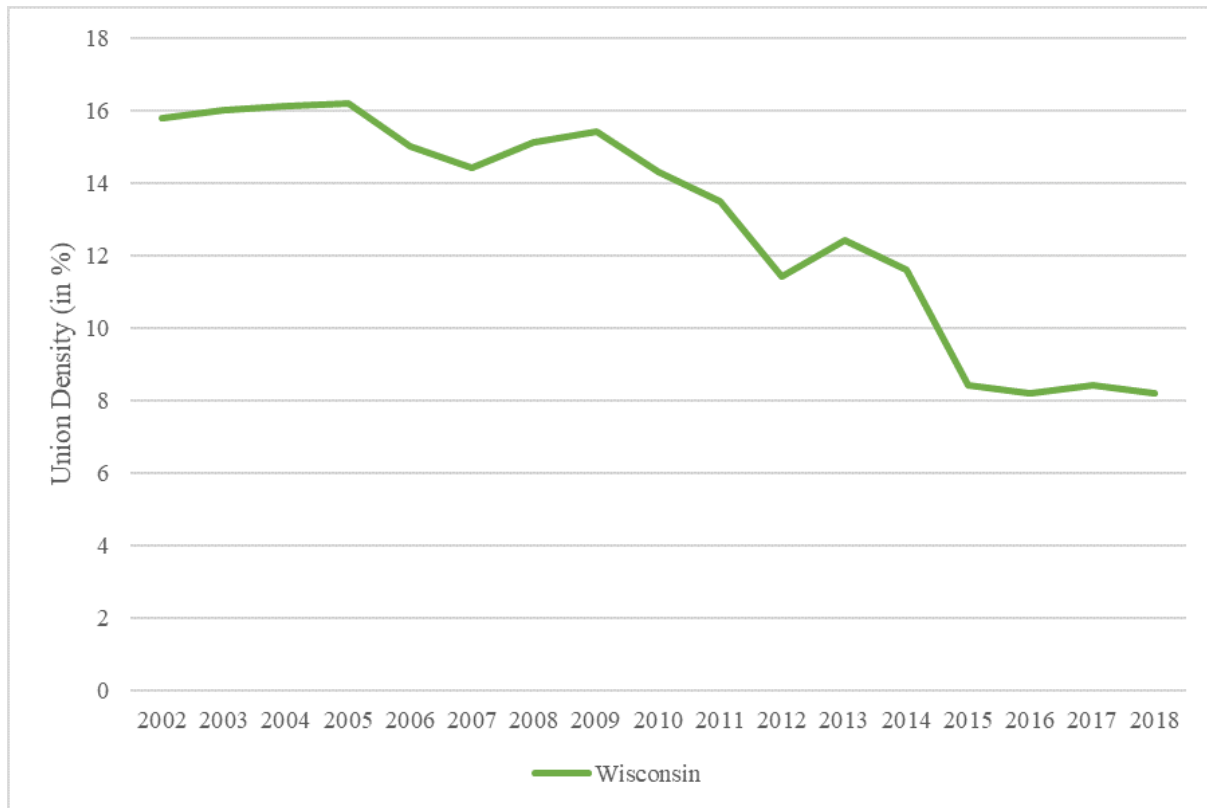
Figure 5: Union Density in Several Right-to-Work States since 2002

4.4. Right-to-work's Impact on the Convergence Clubs

In addition, a variety of states have passed right-to-work legislation since 2012. These states include Indiana (2012), Michigan (2013), Wisconsin (2015), West Virginia (2016), and Kentucky (2017).¹⁰ Michigan, in particular, is interesting as, historically, it was a leading state in terms of union organizing. Figure 5 shows union density for Indiana, Kentucky, Michigan, and West Virginia since 2002. As seen in the figure, there is no clear shift in any of these states near their right-to-work implementation dates.

Figure 6 shows Wisconsin alone. Interestingly, notice that Wisconsin, unlike the other recent right-to-work states, has a large union density drop when the legislation was enacted. Also note that Wisconsin is in a moderate density club now, probably partly as a result of the right-to-work legislation. This brings up a number of avenues for future research. For example, why did Wisconsin behave differently than the other right-to-work states? Also, methods like the synthetic control method can be used to test the impact of interventions (in this case right-to-work legislation) and whether or not the intervention had a significant impact. This would be interesting to do for all the recent right-to-work states. The synthetic control tests are outside the scope of the current paper, but it would be very interesting for future research.

¹⁰Dates come from the National Right to Work Committee. Available at <https://nrtwc.org/facts/state-right-to-work-timeline-2016/>.

Figure 6: Union Density in Wisconsin since 2002

5. CONCLUSION

Labor unions have been in decline in the U.S. since the late 1960s and much qualitative work has been done describing this decline and the differences in unionization among states. Devinatz (2015) notes this fact and suggests that the whole nation may be converging to a low unionization regime. Using the Phillips and Sul (2007, 2009) club convergence method, this paper shows that the U.S. does not appear to be entering a low union density regime considering the nation as a whole. However, there is some evidence to support the works of Friedman (2000), Farhang and Katznelson (2005), Jacobs and Dixon (2006), Shermer (2009), Hogler et al. (2015), and Acharya et al. (2016) who all assert that the American South has a unique political and social environment that prevented unions from forming in the region. The results from the convergence club analysis show that states in the South and in the Great Plains region form their own clusters with lower levels of unionization as opposed to the West Coast, Great Lakes, and Northeast regions with relatively high levels of unionization (with a few notable exceptions such as Alabama and Utah). Further examination of individual states such as Hawaii, Alaska, New York, Alabama, and Utah show that there are still significant regional differences in union density. In particular, states with larger manufacturing bases and more public sector employment tend to have higher union density.

However, as mentioned in the introduction, the 20th century saw large changes in union organizing behavior. As this paper uses historical data and does not engage in forecasting,

there could be further changes in union density in the future. Along these lines, Chauvel and Martin (2017) investigate whether there is a cyclical relationship between union density and income inequality. They find some evidence that higher inequality in the past tends to lead to higher union density in the present. Given the high level of income inequality in the U.S. currently, perhaps union organizing will pick up once again in the future. This may or may not happen though as the recent *Janus vs. AFSCME* decision has the potential to severely curb union membership barring further legislative change. As noted in the introduction, the early 20th century saw large changes in the legal treatment of labor unions so it would not be a shock if large changes happened in the 21st century. In sum, this paper shows using an empirical, data-driven method that the South and Great Plains states are distinct regarding unionization and differ from the rest of the U.S. as described qualitatively in Devinatz (2015), Farhang and Katznelson (2005), Acharya et al. (2016) and others. The author's hope is that the results for individual states may lead to interesting further research for those studying regional union density differences. Also, the convergence method should be useful more generally to researchers in the regional economics field.

REFERENCES

- Acharya, Avidit, Matthew Blackwell, and Maya Sen. (2016) "The Political Legacy of American Slavery," *Journal of Politics*, 78(3), 621–641.
- Apergis, Nicholas, Christina Christou, Rangan Gupta, and Stephen M. Miller. (2018) "Convergence in Income Inequality: Further Evidence from the Club Clustering Methodology across States in the U.S.," *International Advances in Economic Research*, 24(2), 147–161.
- Brennan, Jordan. (2016) "Rising Corporate Concentration, Declining Trade Union Power, and the Growing Income Gap: American Prosperity in Historical Perspective," *Levy Institute of Economics, E-Pamphlet*.
- Chauvel, Louis and Schroeder Martin. (2017) "A Prey-Predator Model of Trade Union Density and Inequality in 12 Advanced Capitalisms over Long Periods," *Kyklos*, 70(1), 3–26.
- Devinatz, Victor G. (2015) "Right-to-Work Laws, the Southernization of U.S. Labor Relations and the U.S. Trade Union Movement's Decline," *Labor Studies Journal*, 40(4), 297–318.
- Dixon, Marc. (2007) "Limiting Labor: Business Political Mobilization and Union Setback in the States," *Journal of Policy History*, 19(3), 313–344.
- Farhang, Sean and Ira Katznelson. (2005) "The Southern Imposition: Congress and Labor in the New Deal and Fair Deal," *Studies in American Political Development*, 19(1), 1.
- Friedman, Gerald. (2000) "The Political Economy of Early Southern Unionism: Race, Politics, and Labor in the South, 1880–1953," *The Journal of Economic History*, 60(2), 384–413.
- Griffin, Larry J., Michael E. Wallace, and Beth A. Rubin. (1986) "Capitalist Resistance to the Organization of Labor before the New Deal: Why? How? Success?," *American Sociological Review*, 51(2), 147–167.
- Grimes, Paul W. and Margaret A. Ray. (1988) "Right-to-work Legislation and Employment Growth in the 1980s: A Shift-share Analysis," *Journal of Regional Analysis and Policy*, 18(2), 78–93.

- Gruben, William C. and Keith R. Phillips. (1990) "Unionization and Unemployment Rates: A Re-examination of Olson's Labor Cartelization Hypothesis," *Review of Regional Studies*, 20(1), 1–9.
- Herndon, James. (2020) "A Note on Price Behavior in Urban Pakistan," *Southern Economic Journal*, 86(3), 1214–1221.
- Hirsch, Barry T., David A. Macpherson, and Wayne G. Vroman. (2001) "Estimates of Union Density by State," *Monthly Labor Review*, 124(7), 51–55.
- Hodrick, Robert J. and Edward C. Prescott. (1997) "Postwar U.S. Business Cycles: An Empirical Investigation," *Journal of Money, Credit, and Banking*, 29(1), 1–16.
- Hogler, Raymond and Christine Henle. (2011) "The Attack on Public Sector Unions in the United States: How Regional Culture Influences Legal Policy," *Labor Law Journal*, 62(3), 136–144.
- Hogler, Raymond, Steven Shulman, and Stephan Weiler. (2004) "Right-to-work Legislation, Social Capital, and Variations in State Union Density," *Review of Regional Studies*, 34(1), 95–111.
- Hogler, Raymond L., Herbert G. Hunt, and Stephan Weiler. (2015) "Killing Unions with Culture: Institutions, Inequality, and the Effects of Labor's Decline in the United States," *Employee Responsibilities and Rights Journal*, 27(1), 63–79.
- Holmes, Mark J., Jesus Otero, and Theodore Panagiotidis. (2019) "Property Heterogeneity and Convergence Club Formation among Local House Prices," *Journal of Housing Economics*, 43, 1–13.
- Jacobs, David and Marc Dixon. (2006) "The Politics of Labor-management Relations: Detecting the Conditions that Affect Changes in Right-to-work Laws," *Social Problems*, 53(1), 118–137.
- Li, Feng, Guangdong Li, Weishan Qin, Jing Qin, and Haitao Ma. (2018) "Identifying Economic Growth Convergence Clubs and their Influencing Factors in China," *Sustainability*, 10(8), 2588.
- Melcher, Cody R. and Michael Goldfield. (2019) *The Failure of Labor Unionism in the U.S. South*.
- Montañés, Antonio and Lorena Olmos. (2013) "Convergence in U.S. House Prices," *Economics Letters*, 121(2), 152–155.
- Pantuosco, Louis J., Darrell Parker, William Seyfried, and Scott Lyman. (2002) "Macroeconomic Differences in Public and Private Union Density: An Analysis of U.S. State Economies," *Review of Regional Studies*, 32(2), 171–186.
- Partridge, Mark D. and Dan S. Rickman. (1995) "Differences in State Unemployment Rates: The Role of Labor and Product Market Structural Shifts," *Southern Economic Journal*, pp. 89–106.
- Peisakhin, Leonid. (2015) *Cultural Legacies: Persistence and Transmission*. Springer.
- Phillips, Peter C.B. and Donggyu Sul. (2007) "Transition Modeling and Econometric Convergence Tests," *Econometrica*, 75(6), 1771–1855.
- Phillips, Peter C.B. and Donggyu Sul. (2009) "Economic Transition and Growth," *Journal of Applied Econometrics*, 24(7), 1153–1185.
- Regis, Paulo Jose, Juan Carlos Cuestas, and Yang Chen. (2015) "Corporate Tax in Europe: Towards Convergence?," *Economics Letters*, 134, 9–12.
- Shermer, Elizabeth Tandy. (2009) "Counter-Organizing the Sunbelt: Right-to-Work Cam-

- paigns and Anti-Union Conservatism, 1943—1958,” *Pacific Historical Review*, 78(1), 81–118.
- Sichera, Roberto and Pietro Pizzuto. (2019) “Convergence Clubs: A Package for Performing the Phillips and Sul’s Club Convergence Clustering Procedure,” *The R Journal*, 11(2), 142–151.
- Stelzner, Mark. (2017) “The New American Way – How Changes in Labour Law are Increasing Inequality,” *Industrial Relations Journal*, 48(3), 231–255.
- Stelzner, Mark. (2019) “The Labor Injunction and Peonage – How Changes in Labor Laws Increased Inequality during the Gilded Age,” *Journal of Post Keynesian Economics*, 42(1), 114–143.
- Tope, Daniel and David Jacobs. (2009) “The Politics of Union Decline: The Contingent Determinants of Union Recognition Elections and Victories,” *American Sociological Review*, 74(5), 842–864.
- Walden, Michael L. (2012) “Explaining Differences in State Unemployment Rates during the Great Recession,” *Journal of Regional Analysis and Policy*, 42(3), 251–257.

APPENDIX 1: DESCRIPTION OF CLUSTERING ALGORITHM USED IN SICHERA AND PIZZUTO (2019)

Sichera and Pizzuto (2019) provide a description of the sorting algorithm they adapted from Phillips and Sul (2007, 2009) for use in R. Below is a reproduction of their sketch of the method.

(a) Finding Convergence Clubs

(1) Cross-section Ordering

Sort units in descending order according to the last panel observation of the period.

(2) Core Group Formation

Run the $\log t$ regression for the first k units ($2 < k < N$) maximizing k under the condition that $t > -1.65$. In other words, chose the core group size k^* as follows:

$$k^* = \operatorname{argmax}_k \{t_k\}$$

subject to

$$\min\{t_k\} > -1.65$$

If the condition $t_k > -1.65$ does not hold for $k = 2$ (the first two units), drop the first unit and repeat the same procedure. If $t_k > -1.65$ does not hold for any units chosen, the whole panel diverges.

(3) Sieve the Data for Club Memberships

After the core group is detected, run the $\log t$ regression for the core group adding (one by one) each unit that does not belong to the core group. If t_k is greater than a critical value c^* , add the new unit in the convergence club. All these units (those included in the core group k^* plus those added) form the first convergence club.

(4) Recursion and Stopping Rule

If there are units for which the previous condition fails, gather all these units in one group and run the $\log t$ test to see if the condition $t_k > -1.65$ holds. If the condition is satisfied, conclude that there are two convergence clubs. Otherwise, steps 1 to 3 should be repeated on the same group to determine whether there are other subgroups that constitute convergence clubs. If no further convergence clubs are found (hence, no k in step 2 satisfies the condition $t_k > -1.65$) the remaining regions diverge.

(b) Merging Clubs

Phillips and Sul (2009) suggest a club merging algorithm to avoid discovering too many clubs due to the selection of the parameter c^* .

(1) Take the first two groups detected in the basic clustering mechanism and run the $\log t$ test. If the t-statistic is larger than -1.65, these groups together form a new convergence club.

(2) Repeat the test adding the next group and continue until the basic condition ($t > -1.65$) holds.

(3) If the convergence hypothesis is rejected, conclude that all previous groups converge, except the last one. Hence, restart the test merging algorithm beginning from the group for which the hypothesis of convergence did not hold.

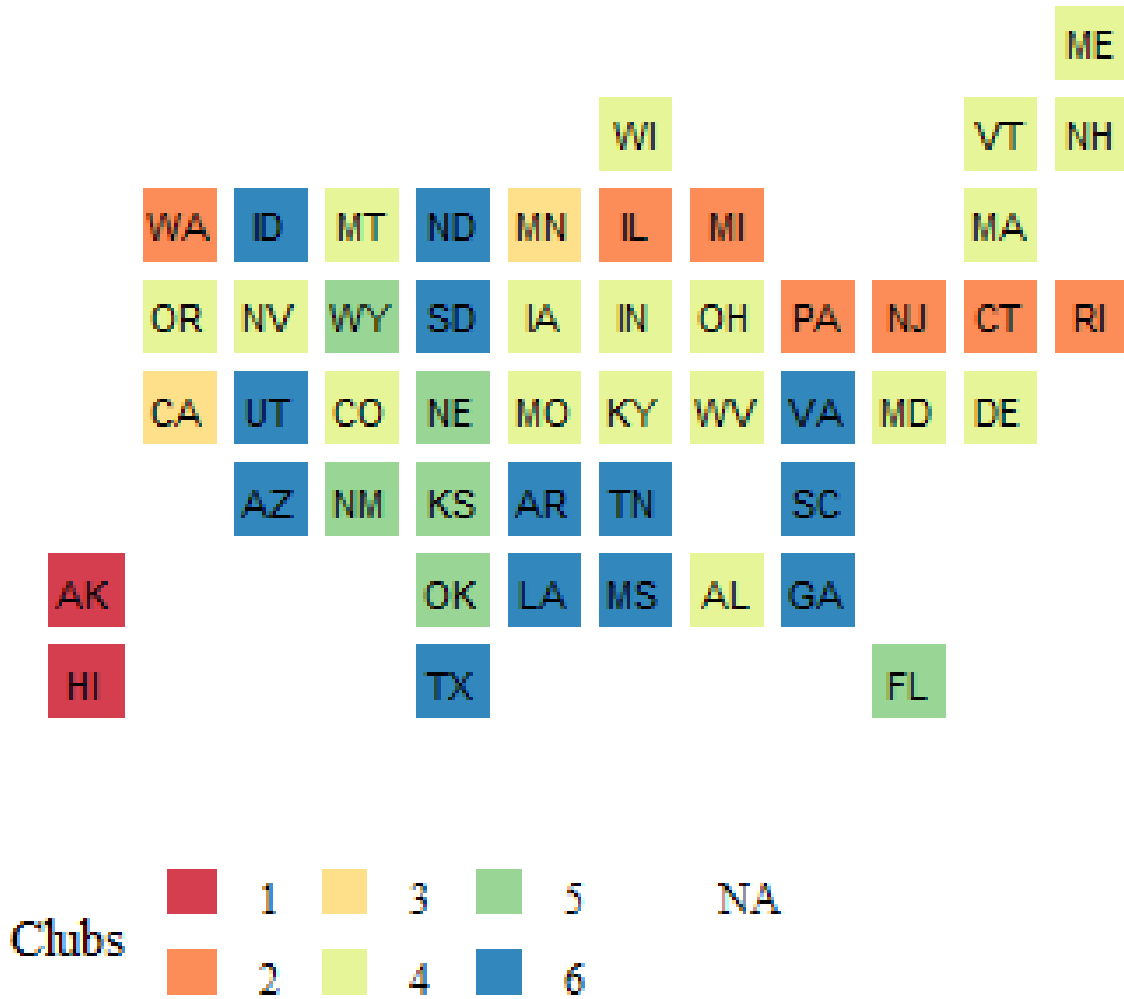
APPENDIX 2: RESULTS USING DIFFERENT ESTIMATION METHODS FOR CONVERGENCE CLUBS

Table A2.1: Convergence Club Results with Fixed Quadratic Spectral Bandwidth and Time Trim of 1/5th of Values

Final Club Classifications			
Clubs	States	Gamma	T-stat
Club 1	Hawaii, Alaska	0.22	0.13
Club 2	Connecticut, Rhode Island, Washington, New Jersey, Illinois, Michigan, Pennsylvania	-0.19	-2.96
Club 3	California, Minnesota	-1.16	-1.21
Club 4	Nevada, Massachusetts, Ohio, Montana, Maine, Vermont, West Virginia, Oregon, Maryland, Delaware, New Hampshire, Kentucky, Colorado, Indiana, Alabama, Missouri, Iowa, Wisconsin	-0.29	-10.38
Club 5	Kansas, Nebraska, New Mexico, Wyoming, Florida, Oklahoma	0.00	0.05
Club 6	Tennessee, South Dakota, Idaho, Mississippi, North Dakota, Arkansas, Louisiana, Virginia, Arizona, Texas, Georgia, Utah, South Carolina	0.11	3.18
Divergent	New York, North Carolina		

Note: Using time trim of 1/5 of values and fixed quadratic spectral bandwidth method.

Figure A2.1: Clubs Mapped from Table A2.1



Note: North Carolina and New York are classified as divergent (NA). These states show up as blank spots in the map.

Table A2.2: Convergence Club Results with Adaptive Quadratic Spectral Bandwidth and Time Trim of 1/3rd of Values

Final Club Classifications			
Clubs	States	Gamma	T-stat
Club 1	Hawaii, Alaska, New York	0.84	12.61
Club 2	Connecticut, Rhode Island, California, New Jersey, Minnesota, Oregon, Illinois, Michigan, Washington, Nevada, Massachusetts, Ohio, Pennsylvania, Montana, Maine, Vermont, Maryland, New Hampshire	-0.09	-0.72
Club 3	West Virginia, Delaware, Kentucky, Colorado, Indiana, Alabama, Missouri, Iowa, Kansas, Wisconsin, Nebraska, New Mexico, Wyoming, Florida, Oklahoma, Arizona, Texas	-0.10	-1.55
Club 4	Tennessee, South Dakota, Idaho, Mississippi, North Dakota, Arkansas, Louisiana, Virginia, Georgia, Utah, South Carolina	0.08	0.60
Divergent	North Carolina		

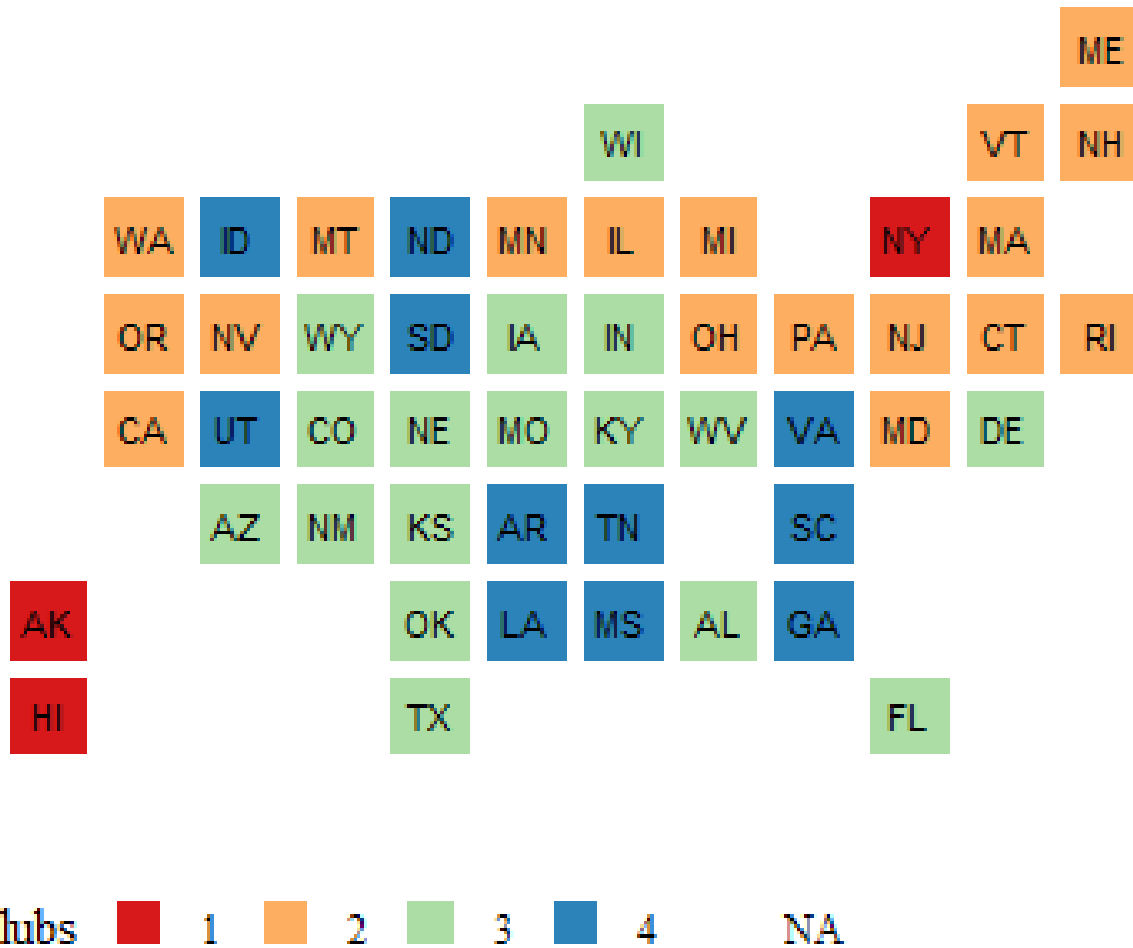
Note: Using time trim of 1/3 of values and adaptive quadratic spectral bandwidth method.

Table A2.3: Convergence Club Results with Adaptive Quadratic Spectral Bandwidth and Time Trim of 1/5th of Values

Final Club Classifications			
Clubs	States	Gamma	T-stat
Club 1	Hawaii, Alaska	0.22	0.12
Club 2	Connecticut, Rhode Island, Washington, New Jersey, Illinois, Michigan, Pennsylvania	-0.19	-2.30
Club 3	Minnesota, Oregon, Vermont	0.00	0.03
Club 4	Nevada, Massachusetts, Ohio, Montana, Maine, West Virginia, Maryland, Delaware, New Hampshire, Colorado, Indiana, Wisconsin	0.01	0.14
Club 5	Kentucky, Alabama	0.50	1.32
Club 6	Missouri, Iowa, Kansas, Nebraska, New Mexico	-0.21	-0.91
Club 7	Wyoming, Florida, Oklahoma, Tennessee, South Dakota, Idaho, Mississippi, North Dakota, Louisiana, Virginia, Arizona, Texas, Georgia, Utah	-0.07	-0.09
Club 8	North Carolina, South Carolina	0.38	0.45
Divergent	New York, California, Arkansas		

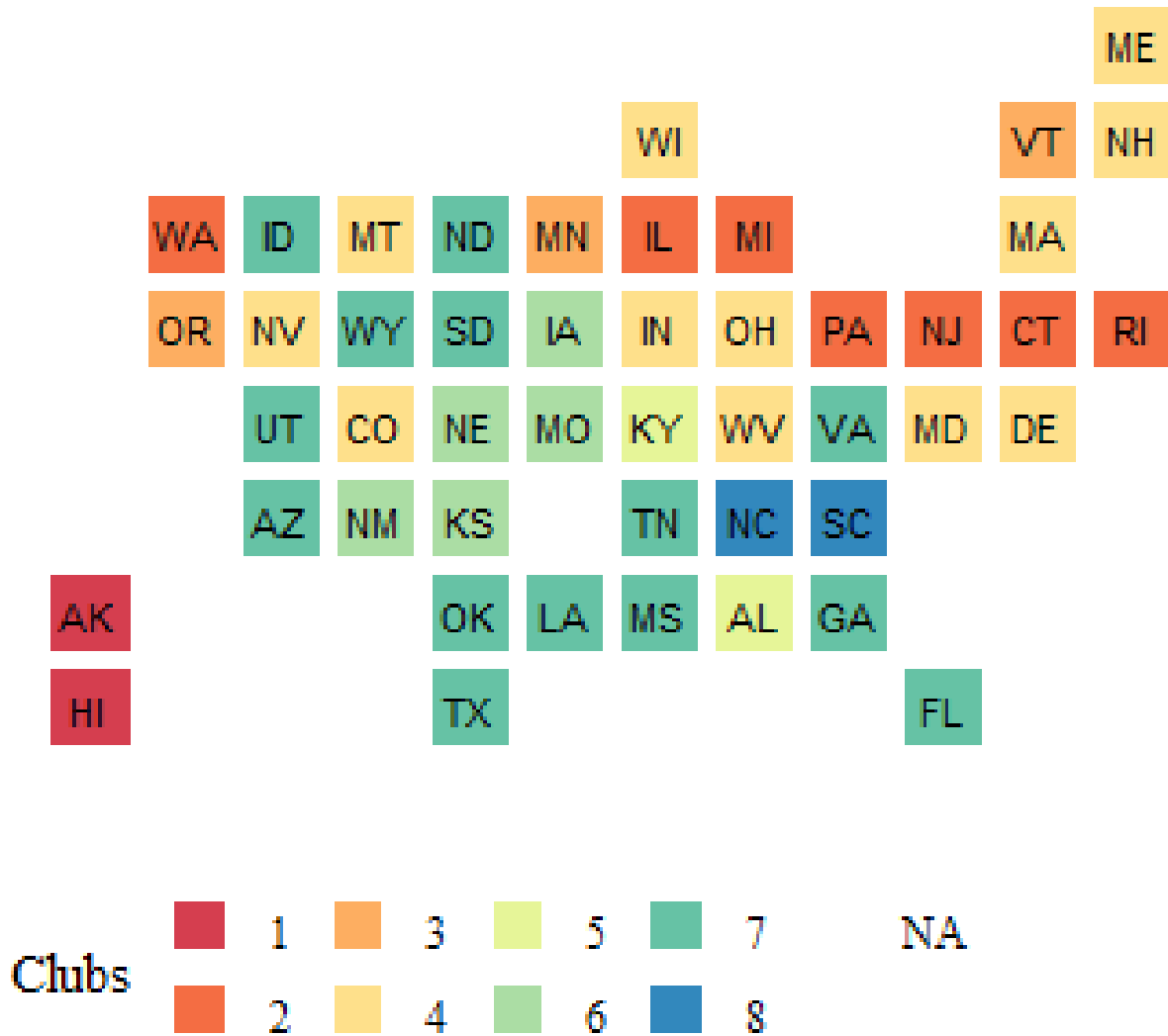
Note: Using time trim of 1/5 of values and adaptive quadratic spectral bandwidth method.

Figure A2.2: Clubs Mapped from Table A2.2



Note: North Carolina is classified as divergent (NA). Thus, North Carolina shows up as a blank spot in the map.

Figure A2.3: Clubs Mapped from Table A2.3



Note: Arkansas, California, and New York are classified as divergent (NA). These states show up as blank spots in the map.

Table A2.4: Results for All States Across the Four Estimation Methods

State	FQSB,1/3 trim	time	FQSB,1/5 trim	time	AQSB,1/3 trim	time	AQSB,1/5 trim	time
Alabama	4		4		3		5	
Alaska	1		1		1		1	
Arizona	4		6		3		7	
Arkansas	6		6		4		Divergent	
California	3		3		2		Divergent	
Colorado	3		4		3		4	
Connecticut	2		2		2		2	
Delaware	4		4		3		4	
Florida	4		5		3		7	
Georgia	6		6		4		7	
Hawaii	1		1		1		1	
Idaho	5		6		4		7	
Illinois	2		2		2		2	
Indiana	4		4		3		4	
Iowa	4		4		3		6	
Kansas	4		5		3		6	
Kentucky	4		4		3		5	
Louisiana	5		6		4		7	
Maine	3		4		2		4	
Maryland	3		4		2		4	
Massachusetts	3		4		2		4	
Michigan	2		2		2		2	
Minnesota	3		3		2		3	
Mississippi	5		6		4		7	
Missouri	4		4		3		6	
Montana	3		4		2		4	
Nebraska	4		5		3		6	
Nevada	3		4		2		4	
New Hampshire	3		4		2		4	
New Jersey	2		2		2		2	
New Mexico	4		5		3		6	
New York	1		Divergent		1		Divergent	
North Carolina	6		Divergent		Divergent		8	
North Dakota	5		6		4		7	
Ohio	3		4		2		4	
Oklahoma	5		5		3		7	
Oregon	3		4		2		3	
Pennsylvania	3		2		2		2	
Rhode Island	2		2		2		2	
South Carolina	6		6		4		8	
South Dakota	5		6		4		7	
Tennessee	6		6		4		7	
Texas	5		6		3		7	
Utah	6		6		4		7	
Vermont	2		4		2		3	
Virginia	6		6		4		7	
Washington	2		2		2		2	
West Virginia	3		4		3		4	
Wisconsin	4		4		3		4	
Wyoming	5		5		3		7	

Table A2.5: Union Density Average Levels for Convergence Clubs

	Union Density (%) Average 1964-2018			
	FQSB, 1/3	FQSB, 1/5	AQSB, 1/3	AQSB, 1/5
Club 1	27.4	26.6	27.4	26.6
Club 2	22.4	23.8	20.9	23.8
Club 3	19.6	21.8	14.5	19.3
Club 4	15.1	18.2	10.1	18.9
Club 5	10.7	11.4		15.4
Club 6	9.0	10.0		13.9
Club 7				10.5
Club 8				5.3