Does municipalization affect the local unemployment rate?

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Abstract

Towns and cities across the United States are considering the municipalization of their electric utilities as an alternative to investor-owned or deregulated utilities. This paper studies the effect of municipalization on local economies, specifically the changes in the unemployment rate in a county that experienced a recent municipalization. A difference-in-differences model analyzes the possible effects of municipalization on unemployment rates between county-pairs given underlying economic trends. The results demonstrate that municipalization may reduce a county's unemployment rate by 6.9% when compared to a county that did not experience a recent municipalization. However, there is evidence suggesting that those counties that have had a recent municipalization are in some way different from those that have not.

I. Introduction

There are two main types of electricity providers: investor owned utilities and municipal or public owned utilities. While both originated in the 1880s when electricity generation and distribution was first made possible, there has been an increased interest in municipalization since the early 1990s. Municipalization of electric utilities generally refers to a city or town acquiring distribution and/or generation assets from the electric utility that currently serves the municipality, such that the municipality becomes the electricity provider for local electricity consumers. This process has taken place in many different communities around the United States, and many other communities are interested in the policy as an alternative to investor owned utilities and the more recent development of deregulation of the entire electric service industry.

This study estimates the effects of municipalization on the local unemployment rate using county-level panel data. Between 1992 and 2007, 17 municipalities in 13 counties around the United States underwent the process of municipalization. Previous research focuses on relative efficiencies between municipal and investor owned utilities with mixed findings. This is the first study to empirically estimate a possible economic impact of municipalization.

Results indicate that municipalization is associated with a reduction in the unemployment rate of a county when compared to another county that had not experienced a municipalization, and that the magnitude of the municipalization affects the magnitude of the associated reduction. There is evidence, however, that counties that

experienced a municipalization and those that do not differ in some way not captured by the model.

II. Background & Literature

This section provides a brief history and explanation of investor owned and municipal utilities, as well as a context for the current study with regards to previous literature.

A. Investor Owned Utilities

In the early years of electric service, many small companies competed for customers. The emergence of generation technologies, coupled with advances in transmission techniques made large-scale production of electricity feasible and cost-effective. Smaller firms began to merge, pooling capital to build bigger production plants that could support many more customers. These big producers and providers are known as private, investor owned utilities (IOUs). States began regulating the IOUs allowing regional monopolies, due to the apparent benefits of scale economies. These regulations also designate specified rates of return on investment for IOUs. This encouraged increased generation to meet the fast-growing demand of the 20th century (Flavin & Lenssen, 1994, Sharabaroff, *et al,* 2009).

Until recently, all IOUs have operated as regulated monopolies, controlling generation, transmission, and distribution in their regions. U.S. lawmakers, hoping to facilitate competition in the industry, passed the Public Utility Regulatory Policies Act

(PURPA) in 1978, and the Energy Policy Act (EP Act) in 1992. PURPA allows companies to produce electricity and sell it in a wholesale market to distributors, while the EP Act gives wholesale buyers the right to pick their suppliers and receive electricity over existing transmission lines, regardless of ownership (Flavin & Lenssen, 1994, Sharabaroff, *et al,* 2009).

In addition to PURPA and EP Act, new technologies increase the economic feasibility of small-scale generation. Because of these developments, monopolistic utilities may not be the best way to provide electricity (Flavin & Lenssen, 1994). In the early 1990s, some states began to push for the restructuring and decentralization of the industry to increase competition, while some towns and cities began pursuing municipalization of electric services to provide better service and lower rates to residents and businesses in their communities.

B. Public Ownership of Electric Utilities & Municipalization

In the early 1900s, some smaller cities and towns lacking the investors to attract a larger regional company decided to form publicly owned, municipal electric utilities. The number of municipal electric utilities peaked around 3000 in the 1920s when scale economies began to shape the industry and larger firms prevailed. Although many municipal electric utilities generate and distribute electricity, it is more normal for municipalities to buy power from other producers and focus on the distribution to local residents and businesses (Kwoka, 2005).

These utilities are much different than IOUs. Since the municipality owns its utility, a mayor, city manager, or the city council may act as decision-makers for business

operations (Peters, 1993). Some municipalities use the municipal electric utility's revenue to fund public projects like schools and libraries, but most are non-profits (Peters, 1993). Presently, there are around 2000 electric utilities under municipal ownership, accounting for about 15% of total sales to ultimate customers (Schweitzer, 1995, Kwoka, 2008). Large U.S. cities with municipal electric utilities include: Los Angeles, Seattle, Detroit, San Antonio, and Cleveland (Kwoka, 2005).

Recently, there has been an increasing interest in municipalization as an alternative to IOUs and restructuring to establish a competitive market. The foremost motivation for municipalization is the prospect of lower electricity rates (Kelly, 1997). The EP Act allows municipalities to act as wholesale buyers of electricity and distributors to residents and businesses in their communities. With access to cheaper electricity and their non-profit nature, municipalized electric utilities can pass savings on to customers in the form of lower rates. Industrial interests often have a large role in encouraging municipalization because they see it as an opportunity to lower their energy bills (Kelly, 1997). Although there are other motivators behind municipalization, such as a community wanting more of its electricity to come from renewable energy sources (Energy Future, 2013), lower electricity rates is the most prominent.

Regulation developments since the 1970s, and increasing interest in transitioning away from state-regulated IOUs has sparked debate over which form of electric utility ownership ought to be preferred. Literature associated with this debate is mostly concerned with the relative efficiency of public versus private ownership.

C. Public vs. Private Ownership: Efficiency

The literature discussing relative efficiency of public and private ownership has mixed findings, and many papers employ only theoretical models and discussions to address the issue. Peters (1993) suggests certain practices of managers of public firms are likely to lead to higher production costs overall, resulting in lower production efficiency when compared to private firms. Neuberg (1977) disputes this claim, relating that public firms attract higher quality management because there is thought to be greater job security. As for electric utilities specifically, municipalized utilities may build their own generation instead of buying electricity from the IOUs even if doing so is cost-inefficient (Wallace & Junk, 1970).

Relatively few papers use data to discuss efficiencies. Kumbhakar and Hjalmarsson (1998) use a hedonic output model based on a utility's physical outputs and the quality and characteristics of such outputs to judge relative efficiency. The authors find increasing returns to scale of distribution, and conclude that private firms are relatively more efficient by using less labor while achieving the same output as a public firm. Neuberg (1977) analyzes relative cost efficiencies of distribution, yielding very different results. He concludes that IOUs may be less efficient in the distribution of electricity than public utilities because rate of return regulation guarantees a profit, which may discourage cost-minimization.

In an article regarding the increased interest in municipalization in the 1990s, Kelly (1997) offers a foundation for the connection between efficiency and electricity rates. Many IOUs are currently constrained by high-cost contracts with independent generation facilities, as the cost to produce energy when these contracts were made was

higher than current prices for alternative generation. The increased competition in wholesale electricity generation due to the EP Act has resulted in increased cost-efficiency of power generation accessible to municipal electric utilities, but not IOUs that have contracts. In this way, municipal electric utilities may be more cost-efficient than IOUs, and can therefore charge lower electricity rates. This connection carries implications for the municipalization debate itself, but lower costs to consumers, especially businesses, could potentially translate into changes in local employment.

D. Municipalization & Employment

Some literature discusses the possible differences in employment between municipal and private utilities based on theory. Niederjohn (2003) suggests the decrease in employment in the electric utility industry since 1998 may be due regulatory reform allowing IOUs to merge, resulting in scale economies that reduce overall employment in the now merged firms. As for employment in municipal utilities, overstaffing may result from certain managerial practices (Peters, 1993, De Alessi, 1974), the public firm's social obligations to the community (Kwoka, 2005, Nombela, 2001), and uncertainties regarding the extent of duties and services the firm is required to perform (Nombela, 2001). Yet, these changes in utility employment would be relatively small when considering the economy of an entire city or county.

Kahn and Mansur's (2013) empirical study of manufacturing industry employment across counties explores the relation between electricity prices and the geographic clustering of employment. The authors separate manufacturing into 21 sectors and create a standardized index based on the energy intensity of each. To analyze

possible differences in employment due to differences in energy prices, the authors compare pairs of counties in which the counties share a border, a method that controls for variables like spatial amenities and local labor market conditions. Thirteen of the 21 sectors studied (those with an energy-intensity index of greater than 0.094) are found to have greater employment in counties with lower electricity rates than neighboring counties with higher electricity rates. The most energy-intensive industry they study, primary metals manufacturing, is found to have an implied price elasticity of employment of -1.65. The authors conclude that as the theory of comparative advantage suggests, energy-intensive firms tend to locate in areas with lower electricity prices to reduce production costs, all else equal. If municipal utilities offer lower rates as compared to an IOU, employment in and around places served by a municipal utility may be higher.

Municipal utilities generally have lower administrative costs, do not have to pay federal income tax, can use tax-exempt municipal bonds, and have access to low-cost, federal power, all decreasing the costs of providing electricity, which often translates to lower rates for consumers (Schweitzer, 1995). A comparison of electricity rates between IOUs and public power providers shows customers of IOUs paying 7% more on average than customers of public utilities (American Public Power Association, 2012). Keeping this mechanism in mind, the current study compares counties that have experienced a recent municipalization to those that have not in order to distinguish relative changes in the unemployment rate that may be a result of the municipalization.

Figure 1 - Locations of Counties Included in Sample

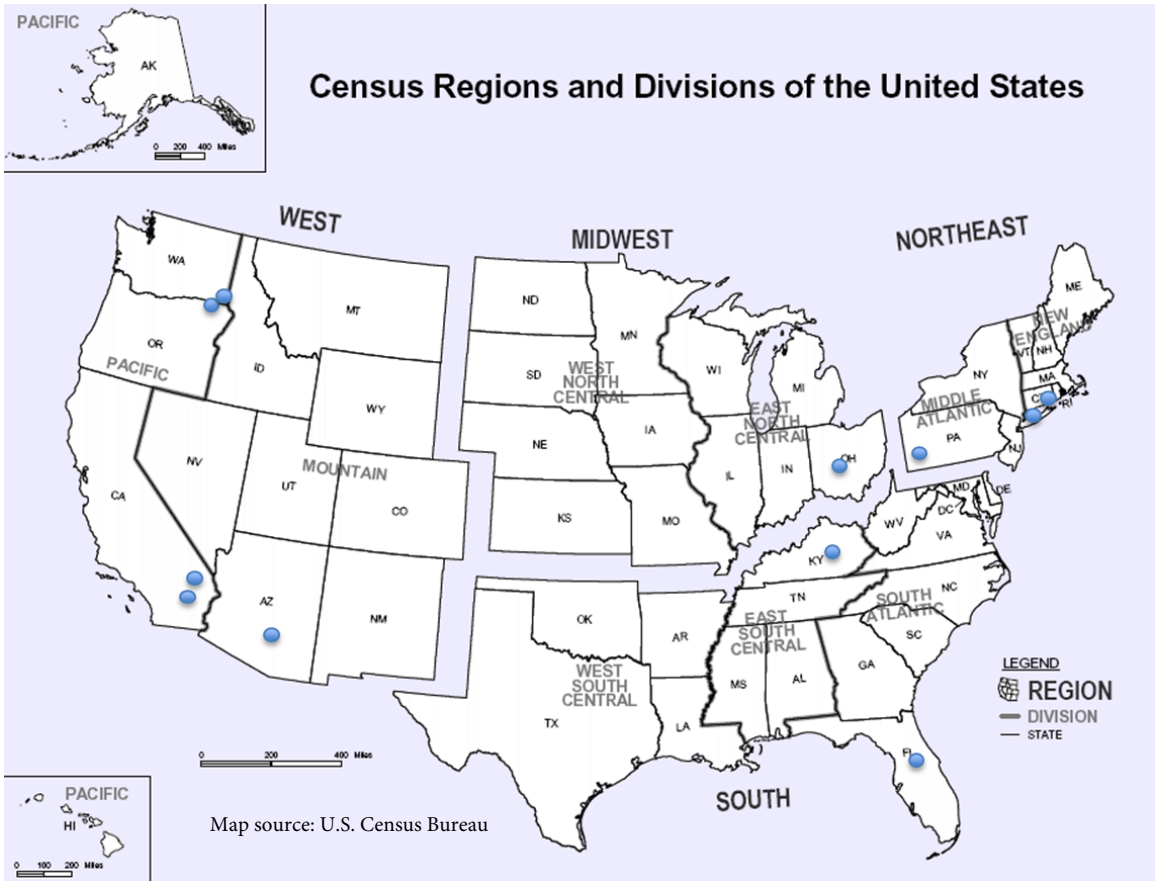

Table 1 - Counties Included in Sample

Year of Municipalization	Treatment Counties (population*)	Control Counties (population)
1997	Pinal, AZ (187,452)	Yavapai, AZ (164,453)
2001	Riverside, CA (1,601,183)	Orange, CA (2,779,098)
2003	San Bernardino, CA (1,731,058)	Santa Clara, CA (1,640,430)
1995	New London, CT (261,469)	Litchfield, CT (182,954)
2005	Orange, FL (899,715)	Hillsborough, FL (1,007,983)
2005	Madison, KY (70,435)	Bullitt, KY (61,002)
1998	Nassau, NY (1,323,981)	Westchester, NY (916,652)
2000	Franklin, OH (1,064,037)	Hamilton, OH (842,825)
2002	Umatilla, OR (69,245)	Polk, OR (62,113)
1999	Allegheny, PA (1,283,765)	Philadelphia, PA (1,523,242)
1995	Asotin, WA (20,291)	Klickitat, WA (18,689)

*(Population values represent a county's mean population from 1992-2007)

III. Data & Methods

Between the years of 1992 and 2007, 17 municipalities in 14 counties around the United States underwent municipalization of electric services in their areas. Of these, necessary data for this analysis is available for 11 municipalities in 11 counties (see Figure 1, Table 1). The outcome variable throughout this analysis is a county's annual unemployment rate, obtained through the Bureau of Labor Statistics' Local Area Unemployment Statistics (LAUS) database. LAUS only has unemployment measures for 1990 to present, as prior to 1990 county-level unemployment rates were calculated much differently and are altogether incomparable according to the Bureau of Labor Statistics.

The main explanatory variable is an indicator of whether a county experienced a municipalization in a recent year, and thus is zero until the municipalization occurs, when it changes to 1 for that year and all years following. The dates of municipalization are provided courtesy of the American Public Power Association (APPA), but need to be compared with U.S. Energy Information Administration (EIA) data found in Form 861 to discern the exact year a municipal utility started serving the community, not when the community decided to municipalize.

Other explanatory variables included in the analysis are obtained from the Bureau of Economic Analysis (population only) and U.S. Census Bureau (all others). These are a county's population, percent of the population that is white, percent of the population with a Bachelor's degree or higher, and percent of the population voting Democrat in Presidential elections. Because the education and political tendency variables are not

available for every year, OLS regressions for each county and variable are used to interpolate between years.

Table 2 - Summary Statistics for Relevant Variables

		Treatment Counties	
	All years	Pre-Municipalization	Post-Municipalization
Unemployment rate	5.29	5.65	4.94
Population	773,876	806,987	741,508
Percent White	86.6	86.9	86.4
Percent Bachelor's degree or higher	22.3	20.9	23.6
Percent voting Democrat	46.3	44.9	47.7
		Control Counties	
	All years	Pre-Municipalization	Post-Municipalization
Unemployment rate	5.32	5.21	5.44
Population	836,312	921,358	753,179
Percent White	83.5	83.9	83.1
Percent Bachelor's degree or higher	25.4	24.0	26.8
Percent voting Democrat	47.8	46.1	49.5
Sample size	352	174	178

A. Primary Specification

A difference-in-differences model is used to test the hypothesis that municipalization changes the unemployment rate of the county in which the municipalization occurs. Building from Kahn and Mansur, this analysis uses county-pairs to control for any underlying unemployment trends that the counties experience regardless of municipalization.

Each of the eleven counties is paired with a control county within the same state that is closest in size of population to the county experiencing the municipalization (see Table 1). The goal in selecting the control counties is to include counties that are similar to those that experienced a municipalization. Using population as a basis helps achieve this goal, as well as selecting a county within the same state. Data for 22 counties over 16 years results in a total of 352 observations. Summary statistics for all of the variables discussed above are reported in Table 2.

The primary specification in this analysis is as follows:

(1) $$Y_{ciy} = \alpha + \beta M_{ciy} + X_{ciy}\varphi + \gamma_y + \delta_i + \varepsilon_{ciy}$$

Y_{ciy} represents the log of the unemployment rate for county c in county-pair i and year y. The unemployment rate is logged to capture any non-linearities in the model, and to facilitate the interpretation of the results, as a percentage change as opposed to a percentage point change can be more easily demonstrated when discussing counties with different unemployment rates. Year and county-pair fixed effects are γ_y and δ_i, respectively, and X_{ciy} contains the set of controls discussed above. The main explanatory variable, M_{ciy}, indicates whether a county in a particular county-pair experienced a municipalization in a recent year. β is the coefficient of interest and is to be interpreted as the presence of a recent municipalization is associated on average with a (100)β% change in the unemployment rate as compared to the unemployment rate of the other county in the county-pair. ε is the error term. The X vector includes the other explanatory variables discussed above. To control for any fixed, unobservable variables that may affect the

unemployment rate or municipalization in a county-pair or year, county-pair and year fixed effects are included in the model.

Using this model, two regressions are run. The first includes the control counties as discussed above. The second regression only includes those eleven counties that experienced a municipalization between 1992 and 2007, decreasing the total number of observations to 176. By limiting the sample in such a way, this second regression is only comparing the counties that experienced a municipalization, and will relate whether or not these counties are somehow inherently different from the control counties in the original sample. Cutting the sample size in half, though, will likely raise the variance of the estimated coefficients, reducing the probability of obtaining statistically significant results.

B. Secondary Specification

A secondary specification employs a panel regression model to estimate the effects of the magnitude of a recent municipalization in a county. In this model, the municipalization indicator variable is replaced with a measure of percent municipalized for county c in year y. The percent municipalized is the number of residents in a county served by a municipal utility divided by that county's population. Again, the unemployment rate is logged, so that the estimated β is interpreted as a 1 percentage point increase in municipalization is associated on average with a $(100)\beta\%$ change in the unemployment rate.

Table 3 - Summary Statistics for Percent Municipalized

	All Years	Pre-Municipalization	Post-Municipalization
All Counties	7.5	3.2	11.5
	(16.2)*	(6.7)	(20.8)
Treatment Counties	9	3.2	14.3
	(18.3)	(4.2)	(23.9)
Control Counties	6	3.1	8.7
	(13.8)	(8.5)	(16.9)
Sample Size	288	138	150

*(Standard deviations are reported below each mean)

Residents served by each municipal utility are reported in the EIA Form 861, a yearly snapshot of all electric utilities in the United States that is available from 1990 to present. Using residents served by a municipal utility instead of commercial businesses or industrial customers allows the analysis to demonstrate population-weighted effects of municipalization. Two counties that experienced a recent municipalization, Pinal, AZ, and Orange, FL had to be dropped from the sample, along with the associated control counties. Pinal County's percent municipalized was calculated to be greater than 400%, probably due to the fact that electricity customers data from the EIA is reported for each utility, not each county, and a municipal utility may serve customers outside of the county in which it operates. Orange County, FL is dropped because of insufficient EIA customer data.

For each county in the sample, including the control counties, the percent municipalized changes on a yearly basis. Summary statistics for this variable are reported

in Table 3. Additionally, most of the counties in the sample had a municipalization prior to 1992, such that percent municipalized is greater than zero for most observations. To compare changes in the unemployment rate across all counties in the sample, county-pair fixed effects are replaced with county fixed effects. As with the primary specification, two regressions are run with this secondary specification. The first includes all counties in the sample besides the four counties that are dropped, resulting in 288 total observations. The second only includes the counties that experienced a municipalization between 1992 and 2007 for the same reason as doing so in the primary model and with the same drawback of lower sample size, now 144 total observations.

IV. Results

The results of this study are reported in Table 4. Column (1) contains the estimations of the difference-in-differences model. These results indicate that all else equal, counties experiencing a municipalization are predicted to see on average a 6.9% reduction in the unemployment rate (significant at the 5% level) when compared to their paired county that did not experience a recent municipalization. If two otherwise similar counties have unemployment rates of 5%, a municipalization in one county is predicted to reduce the county's unemployment rate to 4.66%, assuming the other county's unemployment rate remains the same.

Table 4 - Determinants of County Unemployment Rates[1,2]

	(1)	(2)	(3)	(4)
Recent Municipalization	-0.069	-0.002		
	(0.031)**	(0.037)		
Percent Municipalized			-0.0035	-0.0021
			(0.0008)***	(0.0009)**
Population (millions)	-0.392	-0.935	-0.888	-0.856
	(0.044)***	(0.148)***	(0.116)***	(0.163)***
Percent White	-0.019	0.004	-0.034	0.010
	(0.003)***	(0.009)	(0.009)***	(0.013)
Percent Bachelor's degree or higher	-0.016	-0.023	0.017	0.010
	(0.002)***	(0.018)	(0.018)	(0.024)
Percent voting Democrat	-0.014	-0.003	-0.027	-0.009
	(0.004)***	(0.006)	(0.005)***	(0.008)

[1]Robust standard errors are reported in parentheses
[2] ***, **, * represent 1%, 5%, and 10% significance levels, respectively

Column (2) relates the results of the panel regression of the eleven treatment counties using an indicator variable for when a county experienced a municipalization. These results indicate that a municipalization is associated on average with a 0.2% reduction in the unemployment rate, although this reduction is statistically insignificant. As discussed in the previous section only comparing treatment counties cuts the sample size in half, which should result in higher standard errors on the estimated coefficients and thus more insignificant estimates. This is supported by the increase in standard errors for each estimated coefficient and the associated insignificance of every estimate

besides that for population. The large decrease in magnitude of the coefficient on the indicator of a recent municipalization suggests the counties that experienced a recent municipalization may be different from the counties used as controls in the difference-in-differences approach.

To further understand the relation between municipalization and unemployment, the indicator of the municipalization variable is replaced with percent municipalized, a measure of county population served by a municipal utility. Columns (3) and (4) present estimates for this secondary specification. Because many of the control counties have residents served by a municipal utility, state fixed-effects are replaced with county-fixed effects to allow a comparison across all counties.

Column (3) reports the results of the secondary model when including the nine control counties. All else equal, a county that experiences a 1 percentage point increase in percent municipalized is predicted on average to see a 0.35% reduction in its unemployment rate when compared to another county that did not experience a change in its percent municipalized. This result is significant at the 1% level. Column (4) gives the results of the secondary model using only the eleven treatment counties. The coefficient on percent municipalized is again negative, but smaller in magnitude at 0.21% (significant at the 5% level). The decrease in magnitude, as seen before in comparing columns (1) and (2), demonstrates that counties that have experienced a municipalization since 1992 may be different than the control counties in a way not captured by the model.

Table 3 indicates the average change in percent municipalized for treatment counties from before to after municipalization is about 11%. Table 2 indicates the average unemployment rate for treatment counties before municipalization is 5.65. Using the

results from column (4), an 11% increase in percent municipalized is associated on average with a 2.31% reduction in the unemployment rate. Therefore, the increase in the percent municipalized is associated with a 0.13 reduction in the unemployment rate, resulting in an unemployment rate after municipalization of 5.53. The average post-municipalization unemployment rate for treatment counties in this sample is 4.94, indicating the increase in percent municipalized is associated on average with about 18% of the reduction in unemployment seen post-municipalization.

V. Conclusion

This study is the first to empirically estimate the possible effects of municipalization on a county's unemployment rate. Growing interest in municipalization of electric utilities as an alternative to investor owned utilities and deregulation makes discerning the effects of such a policy choice on the larger economic climate interesting and important in decision-making at the local, state, and national levels. The reduced form econometric unemployment model estimated in this analysis demonstrates that if a county experiences a municipalization, it is predicted on average to see a 6.9% decrease in its unemployment rate when compared to a county of similar population within the same state. However, the counties included in this analysis that experienced a municipalization seem to be different than the included control counties in some way not captured by the model. The predicted reduction in the unemployment rate shrinks to 0.21% when only comparing counties that experienced a municipalization since 1992.

To put this effect in terms of a population-weighted magnitude, an additional 1 percentage point increase in the number of county residents served by a municipal electric utility is predicted on average to reduce the unemployment rate by 0.2% when compared with other counties that have experienced a municipalization in since 1992. This is reduction is associated with about 18% of the decrease in a county's unemployment rate after experiencing a municipalization.

Further research is required to analyze the mechanisms by which this reduction in county unemployment rates may occur. Is it attributable to municipalized electric utilities offering lower rates, attracting employment from energy-intensive firms looking for a comparative advantage? Other research may study whether the estimated effects of municipalization on a county's unemployment rate seen in this study are a result of reverse-causality, or if there is a lead effect of a local unemployment rate on the decision of a city or town to municipalize. Finally, as the results presented here reflect, are counties that experience a municipalization somehow fundamentally different from counties that do not?

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