

# Geographic Spillover of Unionism

by

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## 1. Introduction

Unionization rates vary dramatically across locations. In Flint Michigan, 34 percent of private sector workers are covered by union contracts while in North Carolina only 2.6 percent of workers are covered. One factor underlying this difference is that the automobile industry (which tends to be heavily unionized) is a large part of the Michigan economy and only a small part of the North Carolina economy. While differences in industry composition surely matter, they cannot be the whole story. Even within the same industries, unionization rates are lower in Michigan than North Carolina. In Flint, supermarkets and hospitals are unionized, while all these nonunion in North Carolina.

This paper shows that geographic spillover of unionism combined with industry composition differences together are an important reason for why unionization rates *in the same industry* vary across locations. Unionism is contagious. If a location as part of its comparative advantage happens to specialize in certain industries that are prone to unions such as coal mining or steel, unionism spills over into other industries like hospitals and supermarkets that are not typically unionized.

In recent years there has been much discussion in the economics literature about social interactions of all kinds, including peer group effects in the classroom, knowledge spillovers across firms, and network effects in technology adoption (see Brock and Durlauf). Geographic spillover of unionism is a type of social interaction. In the prototypical model of this literature, a decision making agent is more likely to select a particular option if other agents also choose it because of positive spillover benefits. The identification problem that pervades this literature is distinguishing the existence of spillovers from other explanations for parallel behavior. Individuals who are near each other often share common characteristics that lead them to make similar choices. For example, if we see a neighborhood where every household owns a luxury automobile like a Mercedes-Benz or Lexus, this is probably more an indication of the affluence of the neighborhood than a result of spillovers in car purchase decisions.

These same kind of challenges arise in identifying and measuring spillovers of unionism. Unionization rates tend to be low in the southern states. Historically, southern states have had little employment in union-prone industries like steel and automobiles. Hence,

the absence of spillovers from such industries may well be why supermarkets and hospitals are nonunion in the south. But southern states share three other common characteristics that also might matter. First, the south has had a substantially different racial history than the north. It is widely believed that management in the south used race to break unions, playing off poor whites against blacks. Differences in unionization rates between the north and the south today may in part reflect this different history of race relations. Second, early in the 20th century, the south was quite poor compared to the north. To attract industry, the southern states pursued various anti-union policies, such as right-to-work laws, that contributed to keeping unionization rates low. Third, the south received less immigrants than the north. Such immigrants, like those from Finland, often brought with them “radical” ideas about socialism and these ethnic differences in attitudes towards unions contributed to differences in unionism between the north and south.

In addition to these dealing with these confounding factors, any analysis of how the location of industries affects unionism must confront the fact that effects can go the other way. The extent of unionism at a location may influence which industries locate there. Industries that are prone to unions might avoid areas where unionism is strong. In the 1960s and 1970s, the domestic auto makers GM and Ford pursued a “southern strategy” of locating plants in the south with the specific intent of running nonunion operations. The United Auto Workers fought back hard and eventually organized all the southern plants. Because of selection of where such plants might locate, in the data we might not see a positive connection between the location of such industries and the extent of unionism in other industries, even if positive spillovers exist.

To address these issues, I undertake the following analysis. First, to circumvent endogeneity issues regarding the location of industry, I determine spillovers coming out of from coal mines, metal mines, and steel mills in the 1950s. The primary determinant of the location of mines is nature. Moreover, in the time period I consider, virtually all coal and metal mines were unionized regardless of location, so union avoidance is likely not to have been a primary location factor. Though less so than mines, the location of steel mills is heavily determined by natural factors such as access to raw materials. And like mines, steel mills were everywhere unionized in the 1950s.

Second, to control for confounding factors that vary across the north and the south, my analysis compares locations *within* the same state. This fixed effects approach holds constant state-level anti-union policies and state-level differences in things like race histories. Undertaking such an analysis requires data on unionism at a fine level of geographic and industry detail. Since such data are not available from standard sources, a substantial undertaking was required to collect the data.

Third, to make cross-location *within* industry comparisons of unionization as clean as possible, I focus on non-traded service sector industries. This focus ensures the industries are diffuse enough through the states to make within state comparisons possible (since every location has hospitals and grocery stores). Also, the basic technology for non-traded goods like supermarkets and health care facilities tends to be similar across locations. For traded goods, technologies more likely differ, as locations specialize according to comparative advantage. I place particular focus on the health care sector—hospitals and nursing homes—because this sector leads all others in the total amount of organizing activity over the past 30 years. For the universe of facilities in this sector, I have created establishment-level data on union status. I

I find substantial spillovers of unionism. My bottom line is that even though overall the south had little mining and steel making, there pockets of this activity in the South, particularly around Birmingham, Alabama. My finding is that in these pockets there tends to be relatively high levels of unionism. In Birmingham, one finds unionized nursing homes, supermarkets, even unionized cemeteries, unlike most other places in the south where this is unheard of.

## 1.1 Background about Unions

The thesis of this paper is that unionism in coal mines and steel mills from the mid twentieth century spilled out of these establishments and led to unionism in hospitals and grocery stores that exists today. As background information in support of this case, this section first discusses the extent of unionism in coal mines and steel mills circa 1950. The section then discusses the possible channels through which unionism could have spilled out.

The strength of unions varies over time and across industries. The sources of variations over time are many, but of particular interest here are variations over time in the legal environment. It is widely recognized that the labor environment in the late 1930s was very positive to unions and contributed the high unionization rates at mid-century. (See Freeman, 1998). In contrast, the legal environment is regarded as less friendly to labor now, in addition to other time trends working against labor. (Farber, Neuman and Rissman). The strength of unions varies across industries for various reasons but certainly one of them is differences in capital intensity and sunk costs. Mining and steel production are capital intensive industries with high sunk costs and are hence highly vulnerable to unionization. These industries also have other characteristics, e.g. working conditions, that make them prone to unionization.

Given the favorable legal environment and industry conditions, at mid-century virtually all of the coal mines and steel mills were unionized throughout the country. In 1958, 95 percent of employment in the Primary Metals two-digit industry in the South were in establishments with a majority of workers under agreement (Douty (1960)). Regarding mines, H.G. Lewis wrote, “In 1934 the United Mine Workers, with the assistance of the National Industrial Recovery Act, succeeded in organizing almost all of the bituminous coal mining industry, and from that time to the present the extent of unionism in the industry has been close to 100 percent.”<sup>2</sup> That was written in 1963. Today, although unions continue to be strong in these industries, unions no longer have them locked up. The 1980s saw entry of nonunion “minimills” in the steel industry. Given the strength of unions in mines and mills in the earlier time period, I will focus that time period as a source of a contagion.

At this point it is useful to say more about this spillover. While there is little in the way of academic research that quantifies spillovers of unionism, parties involved in labor relations believe spillovers matter. Unions believe that if a union successfully organizes one plant in area, it makes it easier to organize neighboring plants. To take example, the United Auto Workers is trying very hard to organize the Mercedes Plant in Vance, Alabama.

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<sup>2</sup> Lewis (1963, p. 74). Additional evidence on industry shares is presented in Freeman and Medoff (1979). Table 1 of this paper reports estimates of production worker covered by union contracts by industry. For anthracite and bituminous coal mining, the percentages were 100 and 89 percent. For iron ores and copper ores, the percentages were 100 percent. For blast furnace and basic steel products, the percentage was 98 percent.

According to industry observers, “Vance represents what could be the first domino in a row of non-union transplants....If Vance is organized, Honda’s forthcoming plant in Alabama could be vulnerable.” This view is held by management as well. The Chamber of Commerce of Virginia (a state where unionization is low) offers seminars on “Protecting Our Positive Labor Environment,” and publishes annually the details all of the (relatively few) unionization attempts in the states.<sup>3</sup> The Chamber’s approach of promoting vigilance and mapping union outbreaks is analogous to the way the Centers for Disease Control might approach an infectious disease.

There are several potential transmission mechanisms through which unionism in one establishment might spill over into another establishment. My formal analysis won’t distinguish between these channels. Nevertheless, it is useful up front to explain what I have in mind by a *spillover*.

Unionism can be transmitted from a coal mine to a grocery store when an individual with experience working in a unionized coal miner either changes jobs and works in retail or has children who work in retail. As discussed by Freeman and Medoff (1984), union members tend to have more positive views towards unions as an institution than nonmembers. It is plausible that workers retain these positive attitudes towards unions when they switch jobs. There is a large literature in psychology and organizational behavior that emphasizes the importance of worker’s prior attitudes in determining union organization success. (See Barling, Fullagar, and Kelloway (1992) for a survey.) There is evidence that positive attitudes towards unions can be transmitted through the family. Deshpande and Fiorito (1989) report that individuals who have family members in a union are more likely to have positive views towards unions.

This discussion of “attitudes” can be given an economic interpretation. It is plausible that workers who have never worked in a unionized facility and who don’t know many union members are uncertain about the benefits of unions. Unions may be an “experience good” that one can learn about either through direct experience or the experience of family and friends. With risk aversion, following the logic of Erdem and Keane (1996), the market share of a product—in this case union representation—can be expected to be higher, the greater the

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<sup>3</sup> See [http://www.vachamber.com/pubs/labor\\_info.htm](http://www.vachamber.com/pubs/labor_info.htm).

previous experience with the product.

The above discussion emphasizes the personal connection of a worker with unionism either through his or her own experience or the experience of a family member. But even if none of the workers in a particular establishment have a personal connection to unionism, the workers will benefit more from a union if other people *outside* the establishment in the surrounding area have such a connection. The ability to strike is a crucial component of union success. For a strike to be successful, it is important that replacement workers and customers not cross picket lines. These lines are less likely to be breached in an area where a large fraction of population either works in coal mines or steel mills or has close family members who do.

Another channel for spillovers besides attitudes has to do with union infrastructure and staff. Locations with many unionized mills and coal mines tend to be the homes of numerous professional union staff people with training in organizing and other specialized skills related to unionism. In addition to tending to their responsibilities for existing unionized plants, these staff members are always on the lookout for new opportunities and these opportunities can cross industry boundaries. As will be shown later, at locations where there steel industry is concentrated, it is not uncommon for nursing homes and hospitals to be organized by the Steelworkers union. Of course, this spillover of union organizing staff need not occur through the same union as individuals with specialized skills can switch unions. This is illustrated by the case of one Jon Hitchings now on the staff of the Service Workers union in Harrisburg, Pennsylvania representing social workers. “He had formerly worked for the United Mine Workers working underground for 22 years. He had been the President of the local mine committee and has a good background for protecting workers’ rights.”<sup>4</sup>

## 2. The Data

The first part of this section provides a discussion of regional differences in unionization rates using the standard data source on unions. This standard source is not geographically precise enough for my purposes. This leads me to turn to an alternative source and the

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<sup>4</sup> See the chapter minutes from chapter 5 of local 668 of the SEIU from October 10, 2002 posted at <http://seiu668.localsonline.org/ourlocal/chapter5minutes10102002.cfm>

second part explains what this is.

## 2.1 Regional Differences in Unionism

The standard source about unionization in the United States is the Current Population Survey (CPS). This is a monthly survey of individuals that asks individuals whether or not they are union members or covered by union contracts. Table 1 reports the percent of workers covered by a union contract, by region, for selected industries. I take an average over three years of data, 1999 through 2001, rather than use only one year, since otherwise the sample size is too low for some of the industry/location cells in the table.

For the purposes of the table, the contiguous United States is broken up into the three regions. The *South* consists of the eleven states that joined the Confederacy. The northern border of the South is a border that separates states with right-to-work laws (an anti-union measure) and states without them. (See Holmes (1998)).<sup>5</sup> The next group is the *North*. These are the states in the Midwest and Northeast that are bounded below by the right-to-work border just mentioned as well as on the left by a right-to-work border with the plains states. The North is the traditional industrial heartland of the U.S. and was once called the “manufacturing belt.” The *West* consists of the remaining states, less Alaska and Hawaii.<sup>6</sup>

Looking first at all industries combined (the first row), we see that the coverage rate in the South is 7.7 percent, which is much less than the 19.5 and 15.3 percent rates in the North and West. The last set of columns report the rates for a few selected states. North and South Carolina from the South have the lowest rates in the country at 4.2 and 5.0 percent. Pennsylvania and West Virginia from the North were selected because of their connections to the steel and coal mining industries. The rates in these two states are more than three times as high as the rates in North and South Carolina.

In terms of the underlying production process employed, grocery stores are basically the same throughout the country. Nevertheless, unionization rates are radically different. In

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<sup>5</sup> A right-to-work law went into effect in Oklahoma in 2001. Defining Oklahoma as part of the south makes no difference here.

<sup>6</sup> I throw out Alaska and Hawaii (which have small populations anyway) because some of the historical data I later use are unavailable for these relative newcomers to statehood.



the North and West, the coverage shares are 26.7 and 31.8 percent. This understates the percent of unionized *establishments* in these areas since management positions and other white collar and nonproduction positions are generally nonunion. Hence unionized grocery stores are a relatively common occurrence in the North and West. In the South overall they are rare (a coverage rate of 5.8 percent) and in North and South Carolina the unionized grocery store is virtually nonexistent. An analogous pattern holds for hospitals and nursing homes.

Turning now to the coal and metal mining, we see a very different pattern. For these sectors, unionism is significant in the south, albeit at reduced levels compared to midcentury. For coal and metal mining, 57 percent of workers in this sector are covered. Since on the order of 30 percent of the workers in this industry are salary workers, this implies that approximately eighty percent of the mines in the south are unionized.<sup>7</sup> For the steel sector, 20.4 percent of the workers in the South are covered, which implies that about a third of the establishments are unionized. The advent of nonunion minimills has had a big impact on the southern steel industry. Nonetheless, a significant union presence remains in the southern steel industry.

## 2.2 Alternative Data Sources with Rich Geographic Detail

The empirical analysis of this project requires data on unionization at a fine level of geographic detail. The CPS data is inadequate for this purpose. The first problem is that unlike other Census programs, the CPS is only a tiny sample of the U.S. population so sample sizes can be very small when we go to a high-level of geographic and industry detail. For example, in table 1, I only have 14 observations in the nursing home sector for the state of South Carolina. The CPS is not designed for estimating such narrow quantities. The second problem is that for a large portion of the sample, geographic location within the state is not disclosed. Location in large MSAs (metropolitan statistical areas) is disclosed, but location in the smallest MSAs and rural counties is generally not disclosed. This is a particular problem for me because many of the mining areas that I will be interested in are in rural areas.

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<sup>7</sup> The 30 percent figure is the share of workers in white collar positions (occupation codes 1 through 21 in the CPS) in the coal mining industry.

My need for geographic data at fine level of detail leads me to use two sets of administrative data from federal agencies that regulate unions. The first source is data on expiring union contracts collected by the Federal Mediation and Conciliation Service (FMCS). The National Labor Relations Act requires that notice of contract expiration be filed with this agency. This notice gives the agency a “heads up” so that it can be ready if it has to mediate any strikes. This data is unwieldy. To get a grip on it, I focus on a particular sector, the health care sector. In a painstaking process, I match up the contract data with a longitudinal data set on the population hospitals and nursing homes. DiNardo and Lee (2004) have also recently used this data to look a different question. They use the data in a “wholesale” fashion, using the data from all industries trying to match up all of the contracts. My approach is less ambitious than theirs in terms of industry coverage. But by focusing on only one industry, I am able to do things in terms of matching by hand (see below) and bringing in other sources of information which would not be feasible if one were to look at all industries together.

The second source is data on union representation elections from the National Labor Relations Board (NLRB). My ideal set would consist of a population of establishment with information about the percent of workers under a union contract at each establishment. The NLRB data is different from this ideal, since it provides information flows of organizing activity rather than stocks. However, it is easier to get a grip on this data than it is for the FMCS data. I use the NLRB data to look at 10 large service sector industries for which there is at least some union presence at some locations. Included here are hospitals and nursing homes and there results with the NLRB data are similar to what I get with the more FMCS data.

### **2.2.1 Details of the Matched Health Care Provider Data Set**

My population of health care establishments is the universe of hospitals and nursing homes in existence in 1996. The source of this data is the “Provider of Services” file (POS) for 1996 released by the Centers for Medicare and Medicaid. There are 6,906 hospitals and 15,014 nursing homes.<sup>8</sup> The POS data includes address information, employment information,

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<sup>8</sup> I exclude Alaska and Hawaii here, consistent with the rest of the paper. The 15,014 figure includes only nursing homes that are not part of hospitals.

and facility characteristics, like organizational form (nonprofit, profit, or government) and number of beds. The mean number of beds is 185.1 for hospitals and 112.4 for nursing homes.

I define a health care facility as “unionized” if there was at least one bargaining unit under contract in the facility over the period of the FMCS data, 1986-2003. I matched 26,650 contracts in the FMCS data base with facilities in the 1996 POS. My matching algorithm used the company name, address information, and phone information found in both files. The process required an extensive amount of manual matches and here Google proved invaluable. For example, by Googling a phone number in the FMCS file, I could find additional information about the entity from the FMCS file that would enable me complete the match in the POS file. The overwhelming majority of contracts in the health care cover a bargaining unit at a single establishment. There do exist multi-unit contracts, particularly in the New York area where industry consortia such as the League of Voluntary Hospitals which negotiates an industry contract that covers dozens of facilities. In such cases I obtained additional information, including the actual contracts themselves to identify the establishments covered by the contracts. See the appendix for details about the data.

I identified 3,555 facilities with at least one bargaining unit under contract over the period in question. In this group, the median facility has 6 expiring contracts in the FMCS data. The maximum number of contracts for any one facility is 50 and this is for Washington Hospital in San Francisco. A contract with a given bargaining unit will appear multiple times in the data set as it expires and is renewed on a two or three year cycle. In addition, many facilities have multiple bargaining units with a contract for the registered nurses, a contract for food service workers, etc. Washington Hospital even has a contract for the radiologists.

Panel B of Table 1 shows how the percent of hospitals and nursing home that are union, weighted by beds, varies across regions. Naturally, the percent of establishments that are unionized exceeds the CPS derived percent of *workers* unionized, since not all workers in a given unionized establishment are covered. However, the *relative* differences in unionization across regions is similar for CPS worker-based measure and the establishment-based measure. For my purposes, the advantage of the establishment-based measure is that I can take the

next step and exploit the rich geographic detail of this data.

### 2.2.2 Details of the NLRB Data

I use NLRB data on representation elections (called RC elections) over the period 1980-1999. For each election, the three-digit SIC code of the firm is provided. I restricted attention to retail and service industries with *nonnegligible* union activity. This was defined as follows. For the three-digit industry, there had to be at least 500 elections over the period 1980-1999. Furthermore, the probability of an election taking place for an establishment in the industry had to be at least a half. These probabilities were determined by matching the election data to establishment level data from the County Business Patterns program (CBP). This selection process resulted in the list of eight three-digit SIC industries in Table 1C.

The CBP program provides data on the universe of establishments by industry, county, and detailed employment size category, but provides no information about the name of company for confidentiality reasons. I selected the 1990 CBP as the universe of establishments to match the 1980-1999 NLRB election data to. In the first step of the matching process I linked up NLRB records of the same establishment, using address and company name information. Fully 35 percent of elections are for establishments with more multiple elections. I then matched the NLRB establishment-level data to the CBP data, by three-digit SIC, county, and by establishment size.<sup>9</sup> One issue is that there are establishments with elections before 1990 in the NLRB data that are shut down by 1990, so my process will match them to some other establishment that does exist in 1990. This is not that serious a problem because I am not actually using any information in the CBP record that the NLRB record doesn't already have. The main function of this exercise is to create a denominator for the probability of the event of an organizing election. It sets up a pool of potential election targets from which the given one was drawn. Since the CBP population moves slowly over time, the underlying pool for 1980 is roughly similar to the pool for 1990.

Table 1C reports the fraction of establishments in the 1990 CBP linked up with at least one representation election. It is striking the degree to which these elections are a rare event.

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<sup>9</sup> The NLRB data does not provide information about establishment size. But it does list the size of the bargaining unit. I estimated establishment size in the NLRB data by setting it to twice bargaining unit size.

The nursing home and hospital sectors have substantially larger activities levels. The overall rates are 12 and 20 percent compared with under 5 percent for all the other sectors. Despite the fact that this activity is very rare for these other industries, the basic pattern that the activity is relatively much smaller in the south is the same of these industries as it is for the health care sector.

The relatively large amount of activity in the health care sector was my primary reason for focusing on this sector. The two health care three-digit industries, 8050 and 8060 lead in counts of elections over all three-digit industries, not just service industries. In particular, there were more elections in the health care sector over this period than in the automobile industries.

One thing to note in the Table 1 is that the grocery store industry as compared to the health care industry is that organizing rates are much lower for the grocery industry but levels of unionization are higher. This is due to two factors. First, much of the organization of the grocery store sector predates the 1980s. Second, there are many small "mom and pop" retail operations in the denominator in table 3C. Hospitals and Nursing homes are generally not "mom and pop" operations.

### **2.2.3 Other Variables**

As explained in the introduction, I focus on the mining and primary metals sectors from the midtwentieth century, the heyday of unionism, as a source of contagion. I use data from the 1958 Census to determine the distribution of employment by county. The data published by the Census includes cell counts of establishments by employment size classifications, e.g. employment range 255-499 employees. I use these establishment-level size ranges to estimate employment. For mining, I include metal mining (SIC 1000) and coal mining (SIC 1100 and 1200). Metal manufacturing is defined here as Primary Metals Manufacturing, SIC 3300. See the appendix for more details.

Panel D of Table 1 reports employment shares in mining and metal for 1958 (calculated as a percent of 1960 total employment.) Observe that in 1960, the employment share in these sectors was three times as high in the North as in the South. These industries were essentially non-existent in North and South Carolina. Pennsylvania was the leading steel

producing state and West Virginia a leading coal produce state.

As discussed in the introduction, immigrants may have brought positive attitudes towards unions with them. This is potentially an interesting kind of spillover to look at, but I would like to separate it out here. For my immigration measure I go all the way back to the 1910 Census. Immigration was closed in the 1920s; the 1910 Census has some advantages over the 1920, so I use that. Note the dramatic difference between the North and South in this measure: 28.6 percent of whites in the North and only 3.0 percent of whites in the South.

The last row also highlights the well known historical differences between the North and South in matters of race. In 1910, 35 percent of the population in the South was black compared to only 3 percent in the North. The arguments that race factor contributed to weakness of unions in the South seem plausible to me. (See, for example, Marshall (1967)).

## 2.3 Maps

Figure 1 is a dot density map of all the health care facilities from the 1996 POS file. The blue and red dots depict unionized and nonunion establishments. For emphasis, I use bigger dots for the union facilities. The union facilities overlay the nonunion facilities so in certain dense areas, the blue dots cover red dots underneath.

The maps illustrates remarkable differences in unionization across the country. In South Carolina, the unionized health care facility is a rare bird indeed—the four blue dots in this state are swamped by the 231 red dots. In the parts of the northeast, Midwest, and west coast, unionized facilities are quite common.

Figure 2 illustrates the distribution of employment in mining (coal and metal) and primary metals manufacturing. Each dot indicates a facility with 100 or more workers in 1958. The geographic connection between mining/metal sector and unionized health care facilities is clear. Note first the four states on the southern Atlantic seaboard, Virginia, North and South Carolina, and Georgia. These populous states have little in the way of mining and metal employment and the health care sector is virtually all nonunion. But next go inward and follow along Appalachia, stretching from Western Pennsylvania, West Virginia, Eastern Kentucky, Eastern Tennessee, and then end up in Birmingham, Alabama. In this area, unionized health care facilities are common. Note in particular, the area around Birming-

ham, Alabama. It the steel capital of the south. It is also the main center of unionized health care facilities.

Figure 3 illustrates the subset of health care facilities with at least one contract represented by the Steelworkers union (USWA). There are 108 such facilities. The geographic connection between the location of the health care facilities and the location of mining and metal is obvious.

### 3. Statistical Model

#### 3.1 Notation

I examine the cross-section relationship between an establishment’s current unionization status and the degree to which the establishment’s location is near where the mining and metal industries were located in the 1950s. In terms of notation, for an establishment  $e$  at location  $\ell$ , let  $s_\ell^m$  denote *unionism spillover from metal and mining* at the establishment’s location. Let  $u_e$  be an indicator variable so that  $u_e = 1$  if the establishment is unionized and  $u_e = 0$  if not. I examine the relationship between  $u_e$  and  $s_\ell^m$ , holding fixed various other characteristics of the establishment and the location.

Let  $x_e$  denote a vector of establishment characteristics, e.g. a measure of size or a form of organization (for-profit vs. nonprofit). Let  $z_\ell$  denote a vector of location  $\ell$  characteristics. This will includes a vector of state fixed effects, to capture differences across states in labor market polices, race policies, and mean differences across states in things like immigration. The vector  $z_\ell$  also includes characteristics that potentially vary within a state, beside the spillover  $s_\ell^m$ . Population density of location  $\ell$  is an example.

I exposit the analysis in terms of the choice framework of McFadden. Suppose the value of unionization status to establishment  $e$  is

$$v_e = x_e' \beta + z_\ell' \gamma + \alpha s_\ell^m + \epsilon_e. \quad (1)$$

The establishment is unionized if  $v_e \geq 0$  and is not if  $v_e < 0$ .

Unionism spillovers will be viewed as having a long gestation lag. In particular, the spillovers  $s_{\ell_e}^m$  and  $s_{\ell_e}^r$  will be a function of unionization levels in an earlier period. In the analysis, this earlier period will be approximately 1960. Unionized of health care facilities

were relatively rare in 1960 as the major wave of unionization in health care didn't begin until the late 1960s. Thus the measures  $s_{\ell_e}^m$  and  $s_{\ell_e}^r$  defined for 1960 predate the transitions into union status for the vast majority of the health care establishments that I am considering.

It remains to define the spillover  $s_{\ell}^m$ . In general, this will depend on activity that will cross location boundaries. Define  $q_{\ell}^m$  be the share of employment in the previous period (e.g. 1950s) that was in unionized metal and mining establishments. Think of  $q_{\ell}^m$  as emitting spillovers over the period 1960-2004 over which unionization in the health care sector took place. The spillover  $s_{\ell}$  collected at  $\ell$  is a weighted average of the spillovers being emitted nearby. Let  $y_{k\ell}$  denote the distance in miles between location  $k$  and location  $\ell$ . Let  $N_{\ell}^{\bar{y}} = \{k, y_{k\ell} \leq \bar{y}\}$  be the neighboring locations with  $\bar{y}$  miles of  $\ell$ . Define the spillover by

$$s_{\ell}^m(\delta, \bar{y}) = \frac{\sum_{k \in N_{\ell}^{\bar{y}}} \exp(-\tau y_{k\ell}) n_k q_k^j}{\sum_{k \in N_{\ell}^{\bar{y}}} \exp(-\tau y_{k\ell}) n_k}. \quad (2)$$

This specification weights nearby spillovers being emitted both by population  $n_k$  as well as an exponential decay function that declines with distance. It is similar in spirit to a gravity specification in trade models. The parameter  $\tau$  governs how things decay with distance. The parameter  $\bar{y}$  governs how far one goes out to collect spillovers. In effect, beyond the distance  $\bar{y}$  there is infinite decay of the spillover.

### 3.2 Variables

The main focus is on the matched health care provider data set, the hospitals and nursing homes in existence in 1996. As discussed in Section 2, an establishment is unionized,  $u_e = 1$ , if it has at least one union contract over the period 1986-2003. The establishment characteristics  $x_e$  are size (number of beds and number of beds squared) and a dummy variables for establishment type (non profit, profit, or government). There are a few establishments with a missing value for type; these get a separate dummy variable. Table 2 provides summary statistics.

Location  $\ell$  is defined at the level of the county. The location characteristics  $z_{\ell}$  at the county level are population density (population in 2000 divided by land area), share of whites in 1910 that are foreign born, plus the black population share in 1910. (See Table 1D).



Recall that  $q_\ell^m$  is defined to be the share of total employment in the previous period in unionized mining and metal establishments. The *previous period* is intended to denote the 1950s. As discussed earlier, virtually at that point virtually the entire metal and mining industry was unionized. I will use the share of employment in in 1958 at county  $\ell$  to approximate  $q_\ell^m$ .

I consider two alternative specifications for the spillover function (2). In the *30-mile-spillover specification*, I assume the decay  $\delta = 0$  and that  $\bar{y} = 30$ . The assumption of  $\delta = 0$  makes things easy to estimate. In the *continuous decay specification*, I free up  $\delta$  and impose  $\bar{y} = 75$ .

For the analysis with the NLRB data, the location characteristics are the same. For establishment characteristics, I use employment size category. With the NLRB data, I define union status two ways. In the first way, an establishment is considered to have union status if a representation election ever occurs. Obviously, such an establishment is not necessarily very union, since only half of representation elections are won by unions and even in many of these cases, the union never gets a contract. Nonetheless, getting to the representation election stage is further down the path of union than most establishments get, and it is an interesting event to track. The second way I define union status is having at least one representation election in which the union wins over the period 1980-1999.

### 3.3 Estimates

I estimate the model for the country as a whole and also for the subset of states in the South alone. The extent to which cross-section variation in unionization in the south is associated with cross-section variation in metal and mining spillovers is of particular interest.

Table 3 presents the coefficient estimates for the matched health care provider data set. Table 4 is the estimates of the model for the NLRB data for the two ways of defining the unionization event. All specification include state fixed effects, but for simplicity none of these coefficient estimates are reported. It is worth mentioning that the state fixed effects are large and account for much of the variation in the data. In table 4 for the NLRB data, for simplicity I only report the coefficient on the spillover.

A word about the other variables in Table 3. As might be expected larger facilities are

more likely to be unionized. The effects of the historical demographic variables is quite large. A large share of foreign whites in 1910 substantially increases the likelihood of unionization, as does a larger share of blacks from this period. But deleting these variables leads to virtually no change in the spillover parameters.

I turn now to my primary interest spillover coefficient. For the 30-mile spillover case, the estimate of  $\alpha$  is 7 for all states together and rises to 13 with just the data from the south. The estimate of the coefficient with the continuous decay are much higher. This is not surprising. If spillover effects are very local and decline with distance, then if we were to impose equal weighting of spillovers 2 miles away with those 25 miles away, this is a form of measurement error that will lead to attenuation of the coefficient estimate. Figure 4 graphs the implied weighting functions for local spillovers.

Now turn to the spillover coefficients for the NLRB data. At this point, only the 30-mile spillover specification is available. (See next draft for the continuous decay estimates.) I break the industries into two groups. The first group is nursing homes and hospital. I do this for comparison with the previous results with the matched health care provider data set. The estimates are similar. The estimate of  $\alpha$  is around 6 for all states together and doubles to around 12 for both sets of data. It is interesting and reassuring that these estimates from two completely different data sets yield similar results. Of course, they have the same underlying population of establishments. But in one case unionization is measured by presence of at least once contract. In the other, it is measured by incidence of an election.

Next consider the remaining industries. These are the 6 industries in Table 1D besides nursing homes and hospitals. The estimates of the spillover coefficients are positive, but significantly lower than the estimates for the health care sector. The pattern that the estimates increase when I restrict attention to the south only continues to hold.

### 3.4 Magnitudes

To be completed.

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## 4. Appendix

I took the subset of FMCS contracts designated as from the “health care” industry and matched them to the POS universe. For the purpose of matching, I included the 1991 and 2001 POS files, as well as the 1996 file. I used the address, phone numbers, and name company name information in the FMCS and POS files for matching. The computer did most of the work here, but there was also an extensive amount of manual matching. I made frequent use of Google to complete a match. For example, by Googling a phone number in the FMCS file, I would find out additional information about the entity in the FMCS file. Given the significance of health care providers, there was usual much information on the internet about them. In some cases, I would be able to determine that the FMCS entity was actually a retirement home or a mental health facility, and therefore not part of my underlying universe. In other cases, I would be able to obtain additional information about the facility that would enable me to complete the match to the POS file. I was able to match 96.4 percent of the 27,629 health-care facility contracts in the FMCS data base.

In the health care sector, most labor contracts are at the establishment level. However, in New York and Minnesota, there are industry-wide contracts that are negotiated by consortiums of health care providers. For example, the League of Voluntary Hospitals negotiated a contract with the Service Workers that covers approximately 50 facilities. In majority of such cases, I was able to obtain the actual contract from Department of Labor and from other sources, to determine the facilities covered from the contract language. There were a several important multi-facility contracts that could not be matched this way, particularly the complex set of contracts for the Kaiser health system, a system of hospitals on the west coast that is essentially all union. For such cases, I went to the web sites of the local unions negotiating the contracts where I usually found lists of the covered facilities. Of the 560 facilities listed on union web sites as represented, in 88 percent of the cases I already had one or more matching contracts for the facility in the FMCS data base. I take this as evidence that the matched data are a very reliable.

Table 1

## Panel A. Unionization Rates from the CPS (1999-2001)

	All	South	North	West	NC	SC	PA	WV
All workers	14.9	7.7	19.5	15.3	4.2	5.0	18.3	15.9
Grocery Workers	21.3	5.8	26.7	31.8	1.2	0.0	17.3	11.8
Hospital Workers	15.3	4.7	19.2	20.0	2.7	3.4	15.2	8.0
Nursing Home Workers	10.8	1.9	16.0	6.5	1.9	0.0	17.7	8.3
Mining (Coal and Metal)	30.4	57.5	30.9	23.8	.	.	22.9	33.0
Steel Workers	40.4	20.4	50.6	20.6			52.0	72.2

## Panel B. Unionization Rates in Matched Health-Care Provider Data Set

	All	South	North	West	NC	SC	PA	WV
Hospitals (percent of beds in union facility)	26.0	3.4	38.5	30.4	4.6	2.4	41.2	12.2
Nursing Homes (percent of beds in union facility)	20.2	4.8	31.8	10.9	1.6	1.9	32.3	35.6

Panel C. NLRB Election Rates in Service Industries With Nonnegligible Union Activity

SIC	Industry	All	South	North	West	NC	SC	PA	WV
5410	GROCERY STORES	0.7	0.2	0.7	1.5	0.1	0.1	0.9	1.1
5510	NEW AND USED CAR DEALERS	3.2	0.4	4.7	3.5	0.2	0.3	3.1	4.0
7010	HOTELS, MOTELS, AND TOURIST COURTS	1.9	0.7	2.8	1.9	0.3	0.3	4.3	2.2
7210	LAUNDRY, CLEANING, GARMENT SERVICES	0.7	0.4	0.8	0.9	0.5	0.4	1.2	1.2
7340	SERVICES TO BUILDINGS	1.8	1.1	2.5	1.4	0.6	0.9	3.9	4.1
7510	AUTOMOTIVE RENTALS, WITHOUT DRIVERS	3.3	3.0	3.5	3.4	1.0	0.6	3.4	1.6
8050	NURSING AND PERSONAL CARE FACILITIES	12.1	5.5	18.0	6.8	2.1	5.0	19.6	35.1
8060	HOSPITALS	21.1	2.8	32.5	23.0	1.8	3.7	38.4	24.0

Panel D. Selected Regional Characteristics

	All	South	North	West	NC	SC	PA	WV
Mining employment share (1958)	0.5	0.2	0.6	0.4	0.0	0.0	1.5	11.1
Metal manufacturing employment share (1958)	1.7	0.7	2.4	0.8	0.2	0.1	5.0	3.8
Mining plus Metal share (1958)	2.2	1.0	3.0	1.2	0.2	0.1	6.5	14.9
Foreign Share (1910)	20.7	3.0	28.6	18.7	0.4	1.7	24.7	5.5
Black Share(1910)	10.7	35.2	3.0	1.8	32.5	54.7	2.6	4.9



Table 2  
Summary Statistics

Variable	Hospitals		Nursing Homes	
	Mean	Std	Mean	Std
Union	0.18	0.39	0.15	0.36
Beds	186.50	235.91	112.52	65.42
For Profit	0.48	0.50	0.73	0.44
Non Profit	0.22	0.41	0.22	0.42
Government	0.20	0.40	0.04	0.20
Foreign White Share (1910)	0.33	0.25	0.35	0.25
Black Share (1910)	0.12	0.18	0.10	0.16
	0.02	0.04	0.02	0.03
Number	6,819	6,819	14,936	14,936

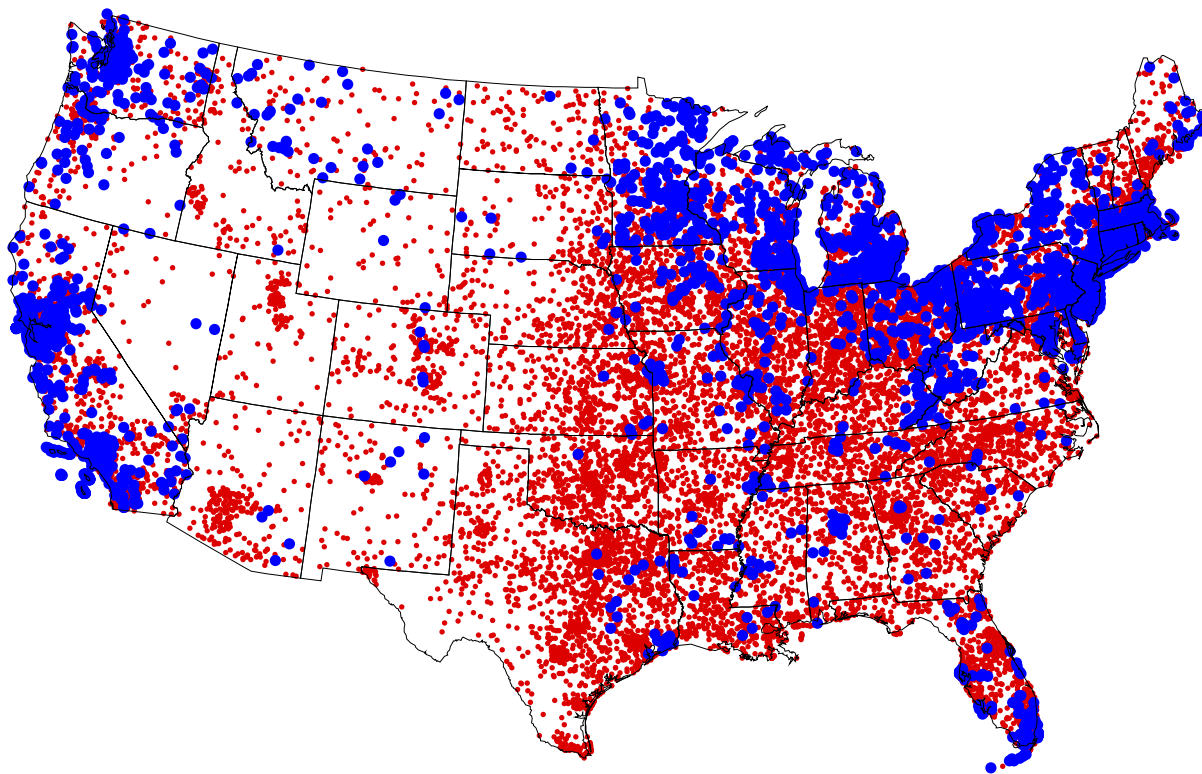
Table 3  
 Logit Estimates for Matched Health Care Provider Data Set  
 (All specifications have state-level fixed effects)

Variable	All States		South Only	
	30 mile Spillover	Continuous decay	30 mile Spillover	Continuous Decay
Constant	-10.88 (.80)	-11.31 (.78)	-11.21 (3.02)	-12.38 (3.00)
For Profit Dummy	0.51 (.06)	0.51 (.06)	1.27 (.29)	1.25 (.29)
Government Dummy	0.34 (.09)	0.34 (.09)	-0.23 (.58)	-0.19 (.58)
Hospital Dummy	-1.35 (.19)	-1.37 (.19)	-0.16 (.81)	-0.13 (.82)
Type Missing Dummy	0.37 (.05)	0.37 (.05)	-0.83 (1.16)	-0.88 (.24)
lnBeds	1.86 (.29)	1.88 (.29)	1.47 (.11)	1.39 (1.15)
(lnBeds) <sup>2</sup>	-0.13 (.03)	-0.13 (.03)	-0.07 (.11)	-0.06 (.11)
Black Share (1910)	3.01 (.49)	3.22 (.45)	3.43 (.52)	4.06 (.54)
Foreign White Share (1910)	2.65 (.17)	2.59 (.17)	0.47 (.80)	0.49 (.82)
Population Density	0.07 (.01)	0.07 (.01)	0.11 (.11)	0.18 (.11)
$\alpha$ (spillover coefficient)	7.35 (.35)	11.57 (1.01)	13.52 (1.98)	30.93 (4.12)
$\delta$ (decay parameter)	-	.04 (.01)		.01 (.01)
N	21,755	21,755	6,194	6,194

Table 4

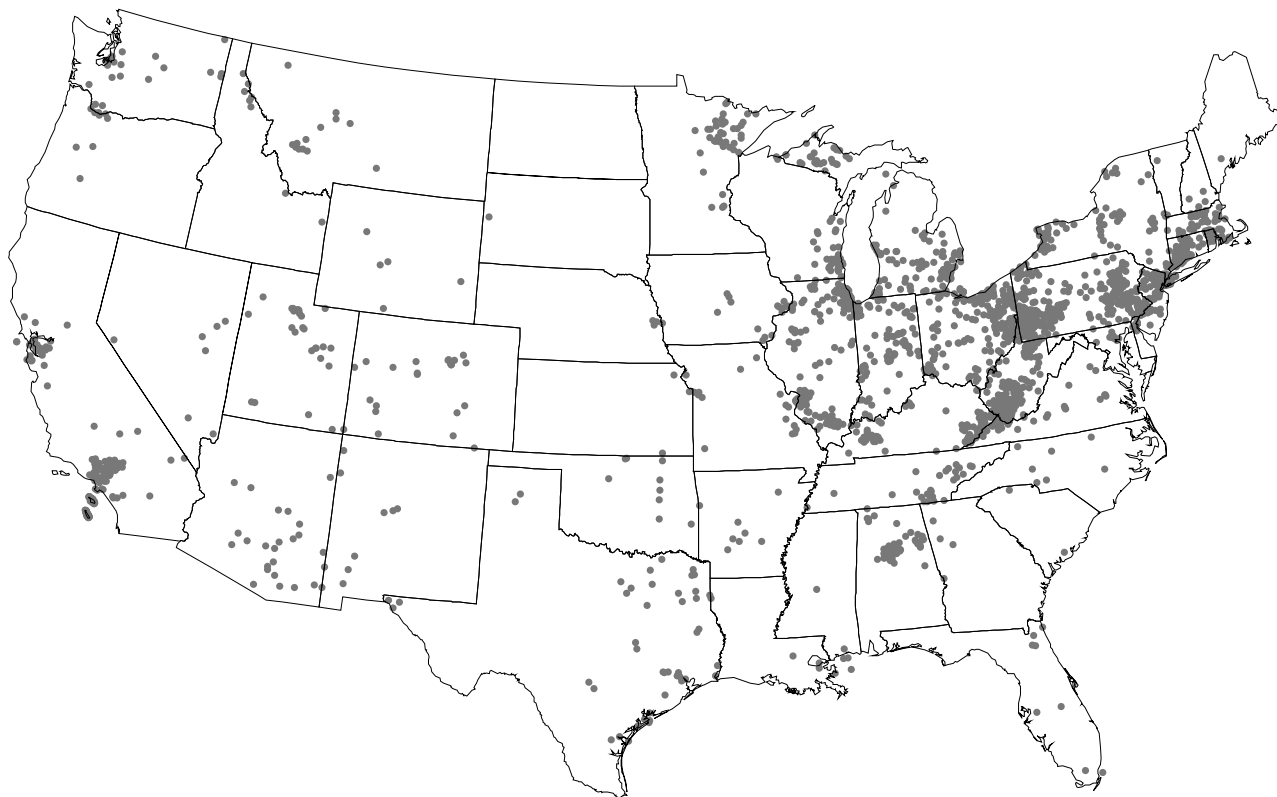
Spillover Coefficient Estimates for NLRB Election Data Set  
30-mile Spillover Assumed

Variable	All States		South Only	
	Hospitals and Nursing Homes	Other Services	Hospitals and Nursing Homes	Other Services
Specification 1: At least one election	5.36 (.52)	1.43 (.44)	10.45 (1.61)	4.61 (1.61)
Specification 2: At least one election in which the union wins	6.21 (.81)	1.93 (.54)	12.74 (1.81)	4.95 (2.08)
N	27,760	323,828	7,557	103,767

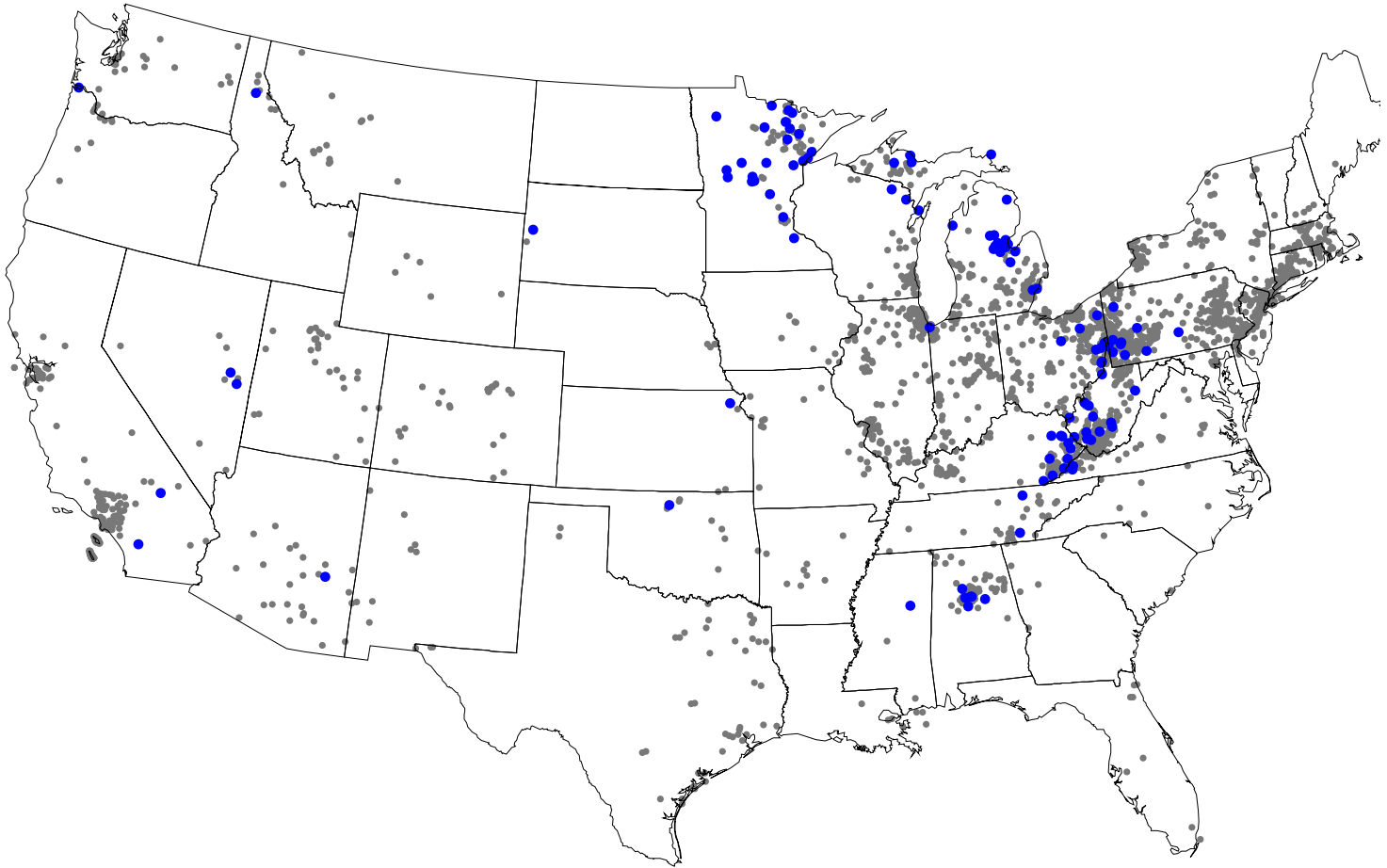


Unionized Health Care Facilities: ● 1 Dot = 1

Non-Unionized Health Care Facilities: ● 1 Dot = 1



Metal Mining Plants: ● 1 Dot = 1



**Health Care Facilities with USWA contracts**

● 1 Dot = 1

● 1 Dot = 1 Metal Mining Plants

Figure 3  
Estimated Decay Process for Spillovers

