

# **Spatial considerations on the effect of smoking regulations on restaurant employment: the case of West Virginia.**

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## **I. Introduction**

In 1992 EPA declared tobacco smoke a Class A carcinogen and concluded that exposure to environmental tobacco smoke (EST) causes substantial health problems.<sup>1</sup> In response to concerns about second hand smoking effects on health, smoking ordinances have been enacted all across the USA. These ordinances regulate smoking in public areas and workplaces, including restaurants. West Virginia has not been an exception, and various regulations have been adopted throughout its counties. What should be pointed out though, is that the severity of the regulations differs from area to area. For example West Virginia, which consists of 55 counties, has substantially different smoking regulations in each of its counties. The variation of the regulation severity between the WV counties can be observed from the differences in the percentage of restaurant space where smoking is allowed.

These smoke-free restaurant policies have created various reactions, related to a broad range of concerns. Such concerns, amongst many, are the health of restaurant patrons and employees, the rights of smokers versus non-smokers, the limits of governmental intervention and the economic effects of these regulations on various parties; restaurant owners, employees, clients. The results of smoking regulations on restaurant business have become a theme of controversy. The major concern has been if business and employment are negatively impacted from these ordinances or not. Restaurant owners and associations have been arguing that smoking regulations in their places have or will affect their revenues, business and restaurant employment negatively. Their argument is not unsubstantiated; if their clients have strong preferences for smoking in their dining area, smoking regulations may lead them to frequent their restaurants less. The actual results of such regulations will actually depend on present and future clientele preferences and the clients' demand elasticities.

Most studies have focused on restaurant sales impacts, but there are also some that have taken interest in employment. In this paper the goal is to try to investigate the possible effect that the smoking regulations may have on restaurant employment. The

investigation though is distinguished from past studies, because it considers spatial variation of smoking regulations as an element that affects the results. This is an interesting question that escapes the limiting generalization under which smoking regulations have been examined up to now; it allows for an examination of differential effects that smoking regulations can have. Past literature has examined some aspects of differential smoking regulation effects, but there has been no earlier interest in spatial considerations. Literature review follows.

## **II. Literature Review**

The effects of smoking regulations on the business and employment of the restaurant sector have become a very controversial theme, and interest in them has made its route into published literature. Most of the studies conducted have concluded that smoking laws do not harm restaurant firms. Glanz and Smith (1994)<sup>3</sup> find that the introduction of the first 15 smoke-free regulations had no effect on restaurant sales. Goldstein and Sobel (1998)<sup>4</sup> found that even in the smoke producing state of North Carolina smoking regulations had no adverse economic impact on the restaurant industry. Similar are the conclusions of Sciacca and Ratliff (1998)<sup>5</sup>. Still these publications are not conclusive as other authors suggested that smoking ordinances lead to loss both in restaurant revenues and jobs<sup>6-8</sup>.

Most of the research has investigated the results of smoke-free regulations on restaurant sales. Fewer studies have researched their impacts on restaurant employment. These impacts though can be extremely important as well, especially for economies that rely a lot on tourism and entertainment. Hyland and Cummings (1999)<sup>9</sup> suggest that the N.Y. smoke free air act did not result at job losses for the city's restaurant industry. Last some literature has pointed out to some differential effects of the smoking laws. Distributional results are the ones that seem to have interested literature up to now. Corsun, Young and Enz (1996)<sup>10</sup> conclude that in response to N.Y. City's Smoke-Free Air Act smokers were eating out less, but that non-smokers were

eating out much more and revenues increased. Dunham and Marlow (2000)<sup>11</sup> examine the distribution effects of the smoking laws on businesses and demonstrate that these laws have different effects on different firms which depend on the smoking prevalence's of the firms' clientele.

### **III. Paper's Investigation**

This study investigates the effects that smoking regulations may have on restaurant employment. Escaping the approach that has been followed up to now, it allows spatial variation of regulations. A spatial dimension to smoking regulations has not been introduced till now and differentiation of smoking regulations amongst different areas as an element to effect restaurant revenues and employment has not been investigated. I believe that it will prove to be an issue of great importance as restaurants with no smoking regulations relatively near areas that are subject to regulation may well become substitutes for dining and vice versa. It is also an alternative way of examining differential effects of smoking regulations to the restaurant industry. In addition it makes the investigation in relation to smoking regulations more realistic as different areas are subject to different smoking regulations that range from no regulation to 100% non-smoking in restaurants. In this study a simple comparison of an a-spatial analysis of the subject, with an analysis that takes space into account, will provide evidence that space not only has an important role to play in relation to how smoking regulations affect restaurant employment but also that when taken into account it changes the results of the study.

To investigate the effects that smoking regulations may have on restaurant employment this study will check for correlation between smoking regulations and restaurant employment. To investigate if spatial differentiation of these regulations affects employment, the paper first looks at the results of a correlation analysis when space is ignored, and then looks at the correlation between smoking ordinances and restaurant employment when space is incorporated in the analysis.

The usage of employment as an investigation variable serves two purposes. First it looks at the results of smoking regulations directly on employment. These effects are an issue of interest on their own. This is especially true for areas that suffer from high unemployment. It is also important for areas where a great part of their economy and employment is based on tourism and entertainment. Second it can indirectly allow assumptions about the impacts of regulations on restaurant revenues and profits. If regulation does lead to a fall of revenues, a fall in profits will initiate a cut down in variable costs, as labor. The restaurant employment can usually be assumed to be directly dependent on services demanded from the restaurant's clientele; less clients or less business means that less employees are needed to serve the existing demand for food services in the restaurant.

More details about the investigation are introduced in the methodology section of the paper.

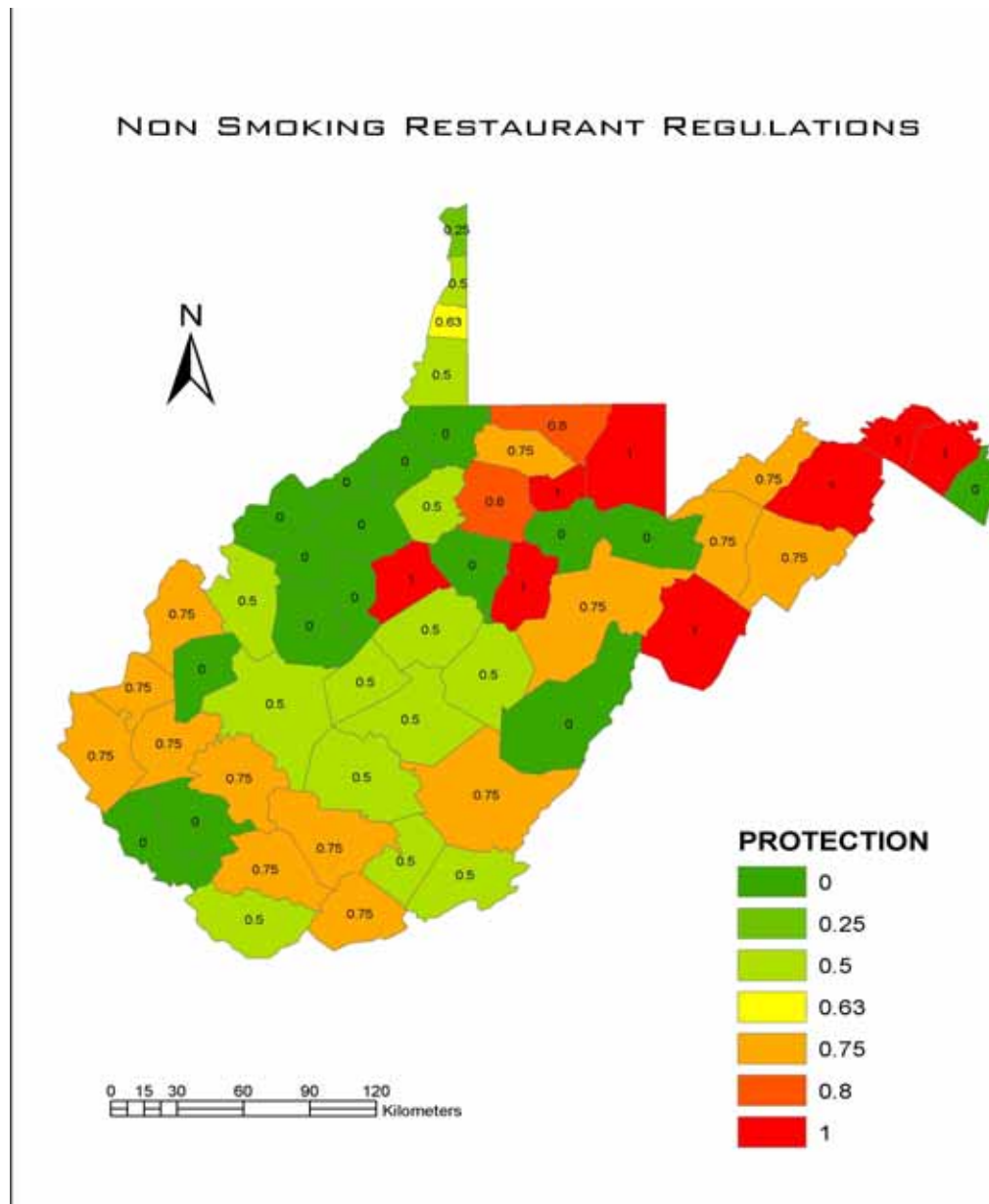
#### **IV. West Virginia**

In this project we examine impacts of smoking regulations in West Virginia. The case of West Virginia is used as an example for the affect that smoking regulations have on restaurant employment. Nonetheless the case of West Virginia presents some special interest as well, because West Virginia is a state that has high smoking rates in relation to the rest of the US. It actually has the 6<sup>th</sup> highest smoking rate in all the United States<sup>2</sup>. A lot of the earlier publications examined areas with low smoking rates and it is possible that the results for West Virginia will defer from earlier publications, which usually conclude that no relation exists between smoking regulations and restaurant business, because of this difference.

The state consists of 58 counties. Each county has a different percentage of smoking prohibition that is imposed in restaurant space. 100% non-smoking implies that smoking is not allowed anywhere in the restaurant. 30% non-smoking regulation allows smoking in 70% of the restaurant space (usually measured in tables) and

necessitates the management to have a non-smoking section in 30% of the restaurant space. In accordance 0% smoking regulation means that smoking is allowed throughout the restaurant, and no ordinance is imposed. Ventilation issues were ignored in the study because they were too difficult to quantify. No regulation is found in 16 of WV's counties, whereas 100% regulation found in 8 counties. Most counties have smoking regulations that are a percentage between 0%-100% non-smoking.

Smoking Regulations; normalized to a scale of 0-1: Figure 1



## V. Data

- WV counties
- WV cities over 2500 inhabitants
- West Virginia smoking regulations
- WV Employment in the restaurant industry.

<b>DATA LAYER INFORMATION</b>		
<b>Data Layer</b>	<b>Source</b>	<b>Resolution</b>
US Counties	<b>GIS Data Depot</b> <a href="http://www.gisdatadepot.com/">http://www.gisdatadepot.com/</a>	1:100,000
WV Cities over 2500 inhabitants	<b>WV GIS Technical Center</b> <a href="http://wvgis.wvu.edu/">http://wvgis.wvu.edu/</a>  Primary: US Census	1:2,000,000
West Virginia Counties' Smoking Regulations	<b>WV Bureau for Public Health</b> (Health Statistics Center) <a href="http://www.wvdhhr.org/bph/">http://www.wvdhhr.org/bph/</a>	Non spatial data
WV Employment in the Restaurant Sector (unpublished data)	<b>WV Bureau of Employment Programs</b> <a href="http://www.state.wv.us/bep/">http://www.state.wv.us/bep/</a>	Non spatial data

## **VI. Methodology**

In investigating the effects that smoking regulations may have on restaurant employment the study separates the issue to a non-spatial and a spatial analysis. The paper first looks at the results of a correlation analysis when space is ignored, and then looks at the correlation between smoking ordinances and restaurant employment when space is incorporated in the analysis. Discrepancies in the results will provide evidence that space not only has an important role to play in relation to how smoking regulations affect restaurant employment but also that ignoring it distorts the results.

Correlation is determined at the county level. At the time of the study confidentiality issues did not allow for an examination of the matter in a larger scale (zips, towns or eating places).

Though in the study WV is used as an example, not all WV counties are actually used in the analysis. To investigate how spatial differentiation influences employment, it is necessary to have, for every county used in the analysis, the smoking regulation for all the counties that surrounded it. Since data was only available for WV counties, the boundary counties to other states could not be used for the analysis. Only the below subset of counties are used.



will be done by examining if correlation exists between them; that is if counties with high values of smoking regulations usually have low or negative employment changes in the restaurant sector for 1992-2000. The analysis will be presented on section. VII.

4. An index of the spatial variability of regulations around each county is created. This is a measure of spatial differentiation of the regulations around each county. This index is the second variable that will be used for the spatial correlation analysis. To create this index multicriteria analysis is again used.

a. Computation of sensitivity weight for the degree of influence each county has on its neighboring counties

b. Multicriteria analysis for the creation of the spatial differentiation measure of the regulations around each county.

After this step we can examine what relationship exists between smoking regulations and employment changes in a spatial context, and if space affects the results of the analysis. The correlation of the spatial differentiation index and the employment change for each county is extracted and presented at section VII.

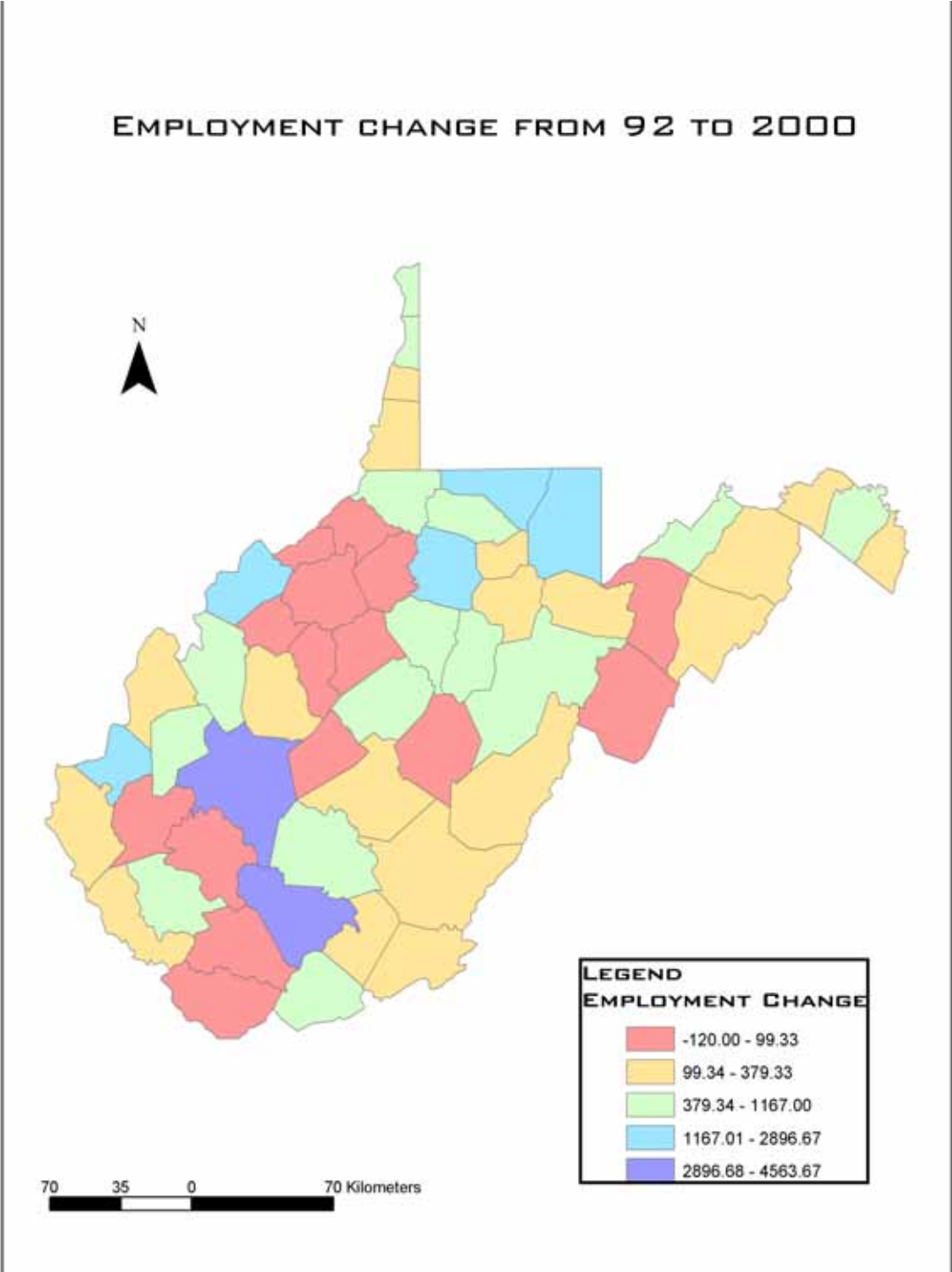
Some of the above steps are discussed and explained in detail below

## **2. Employment changes from 1992-2001**

The main question in the paper is how smoking ordinances have affected restaurant employment. What needs to be pointed out here is that policies influences are not limited at the time when they are set up but extend for years to come. These influences can be expressed as changes that are observed after the policy imposition. To make sure that enough time has elapsed to allow these smoking policies to leave their fingerprint on the variable in question we examine the changes in employment that occurred from 1992-2000 for each county. All the smoking regulations that came in effect in West Virginia were enacted after 1992. 1992 becomes the base year of the analysis and any negative influence of the smoking regulations on the employment level will be expressed as a low or negative change in employment after that. Common

time trends in restaurant employment are eliminated from the correlation analysis as they affect all counties simultaneously.

Employment changes from 1992 to 2000: Figure 3

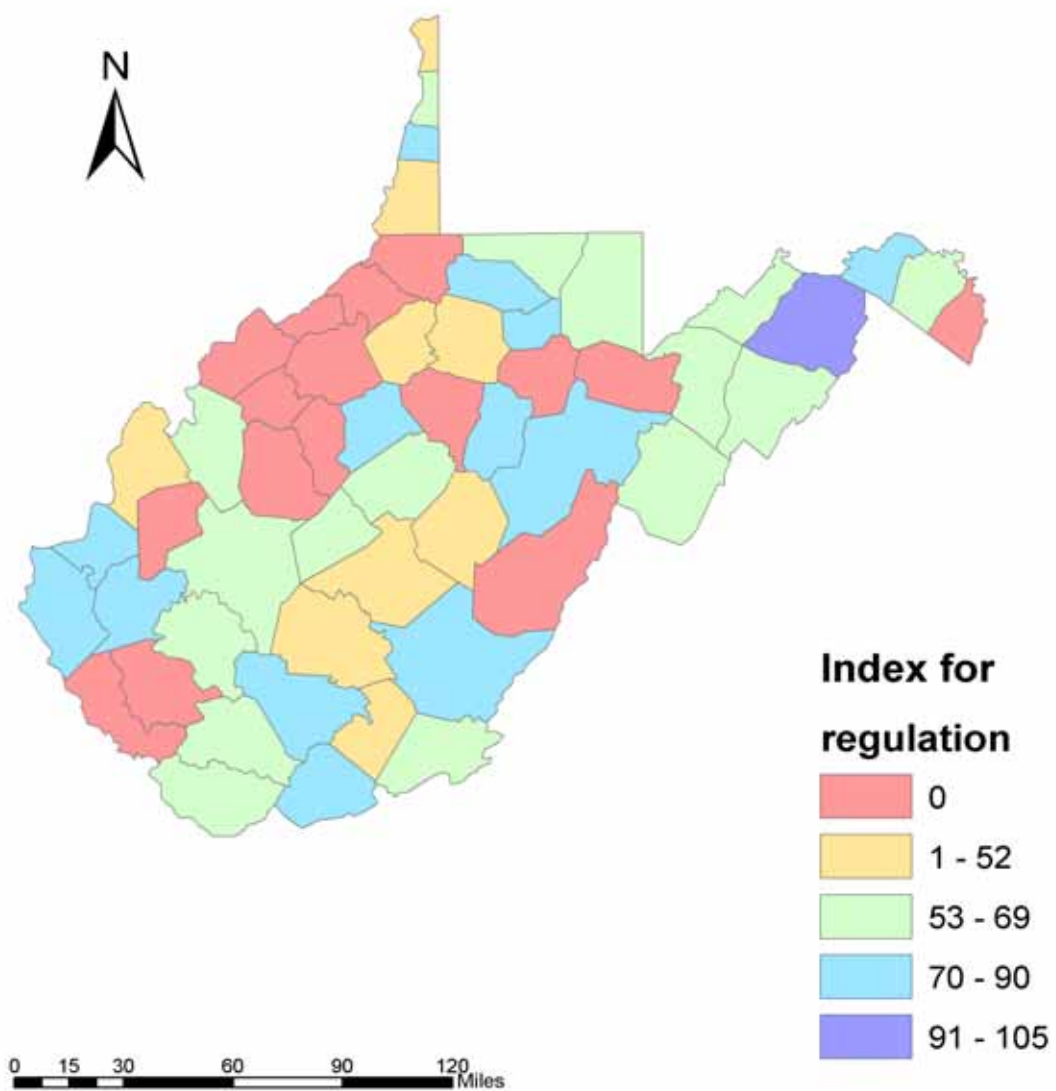


### **3. Index of regulation severity per county**

Every county has a smoking regulation that varies from 0% to 100% non smoking in restaurants. What the paper wishes to investigate is how the policy severity correlates to the employment change in every county. In simple words if the employment change is negatively affected by the regulation severity for smoking in the WV counties. Unfortunately to uncover such a relationship it is not possible to use just the smoking regulation for every county. The reason for this obstacle is that smoking ordinances in different counties were initiated at different dates and have influenced employment for a different amount of time. To avoid this problem multicriteria analysis is used and the period for which the policy is in effect is taken into account. The smoking regulation and the time for which the policy is in affect are weighted by 0.65 and 0.35 accordingly for determining the regulation severity in every county.

Non-Smoking Regulation Severity: Figure 4

### NON-SMOKING REGULATION SEVERITY INDEX



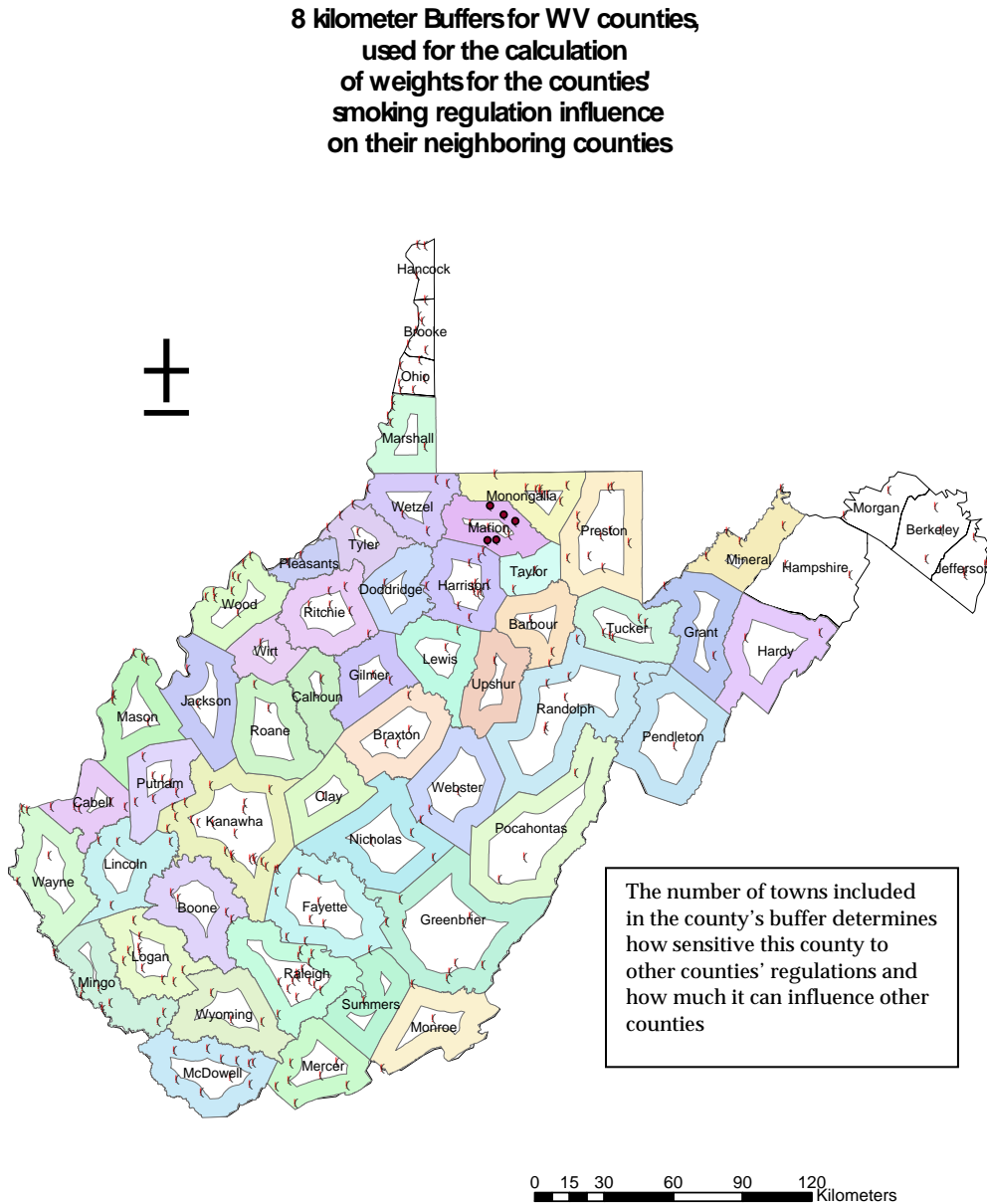
#### **4. Index of the spatial variability of regulations around each county**

The second part of the study is to examine if smoking regulations have a negative effect on restaurant employment changes when space is taken into account and if this affect remains the same as in the case where space is ignored. The importance of space in this case lies in the fact that smoking regulations differ throughout space. The essence of the question is if spatial variability of smoking regulations has an effect on employment. To examine this we need to create an index of regulation variability around each county. The idea is that differentiation of regulations around a county that faces a specific regulation in itself provides restaurant clients with choices of leaving their county and dining somewhere close where smoking regulations match their own smoking taste.

To create this index we use the difference between each county's regulation from the regulation in all the counties that are adjacent to it. But it is necessary to adjust for the importance that every adjacent county can have on the restaurant choices of the citizens of the county in question. Some counties may have a very different regulation than the one in question and may accommodate the tastes of some of this county's citizens, but, it may not be very convenient or close for people to go there, or it may be possible that not many restaurants are in the county. Because of this availability issue a normalized weight is applied to every county when determining its influence to surrounding counties. This weight of possible influence that every county can have is created from estimating the number of large towns (over 2500 in population) that could be found in a distance of 8 kilometers from the county's boundary. Counties with larger towns near their boundaries would probably attract more dinners that were unhappy with the smoking regulations in their own area. In other words 8 kilometer buffers are created and the number of large towns in them becomes their sensitivity weight for the degree of influence each county has on its neighboring counties. I make two assumptions: a) the larger the cities the more eating establishments can be found there,

and b) 8 kilometers to one county's boundary ,and 8 more from the other county's boundary is the maximum distance one is willing to travel for dining out.

Sensitivity weight for the degree of influence each county has on its neighboring counties: Figure 5

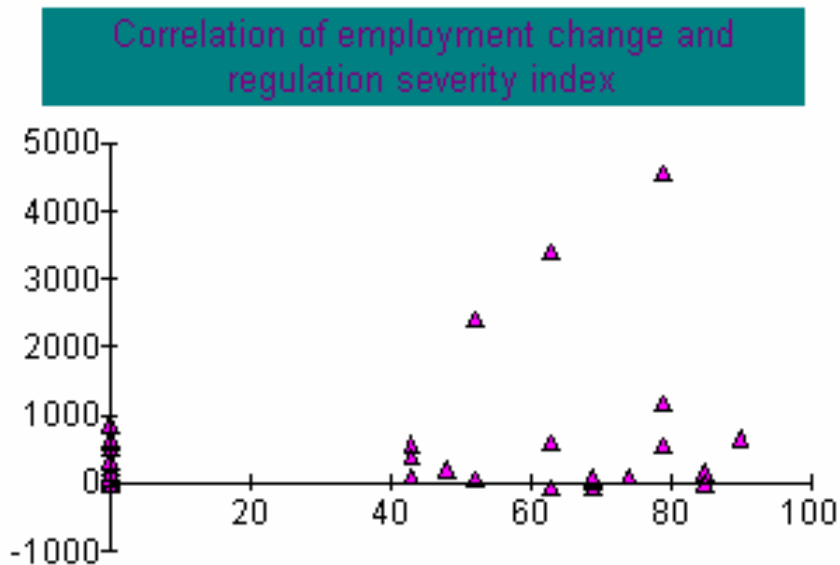


The index for spatial regulation variability to neighboring counties regulations is expressed as a difference of the county's regulation to the regulation of all of its adjacent counties. Every adjacent county's difference from the relevant county's regulation is added after being multiplied by the correspondent weight (determined above).

## **VII. Results**

The first question that is examined is the correlation between smoking regulations severity and the change in employment levels. The result is not different from those that have seen publicity in the past. No evident trend seems to exist between smoking regulations and employment levels.

Correlation of employment change and regulation severity: Figure 6



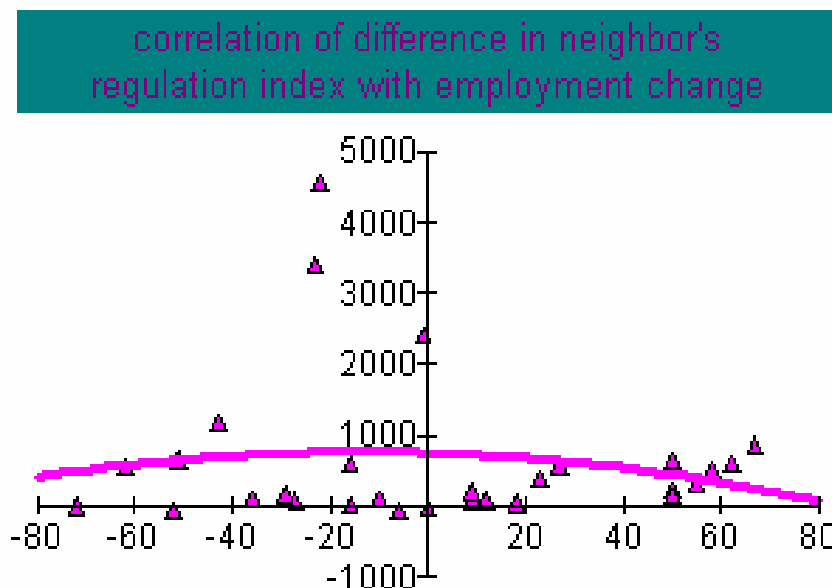
The Y axis is the employment change and the X axis is the smoking regulation

Though no evident correlation seems to exist, the correlation graph shows an interesting effect. There is an increased dispersion as the non-smoking requirements go up. This means that the effect of smoking regulation on employment may be much

more diverse as the smoking becomes more restrictive. This result may be linked to the differential effects that smoking regulations may have, and is evidence that they should not be taken lightly.

The second and most creative question is if spatial variability of smoking regulations around each county has an effect on the restaurant employment of the counties in examination. Here a trend is much more obvious. As the difference of the smoking regulation in each county to its adjacent counties becomes bigger, thus implying that counties around it have more strict smoking regulations in the case of a positive index or less strict regulations in the case of a negative index, the employment change between 1992 and 2000 becomes much smaller. This means that the restaurant sector has experienced lower growth rates in areas where regulations differ substantially from regulations in neighboring counties, and greater spatial variability exists. Spatial variability of regulations around a county, affects the restaurant employment in that county negatively.

Correlation of spatial variability of regulations and Employment Change: Figure 7



The Y axis is the employment change and the X axis is the index of spatial variability of smoking regulations around a county

## **VIII. Conclusions**

The above results show in great connotation that the space is very important when considering the issue of smoking regulations, and cannot be ignored, because it influences the results. As people have more choices, given the differences in smoking regulations between counties in an area that is within their proximity, they are more likely to substitute restaurants in their area with restaurants in nearby places that are subject to regulations that are closer to their preferences. This substitution lowers restaurant employment in areas where substitution is possible, implying that restaurant revenues have suffered by this spatial variability of regulations.

Of course this analysis has been a preliminary examination and has two weaknesses. First the examination of this relationship in a county level is not as precise as an examination in a town or an establishment level. Second using GIS software does not make it possible to include all other possible determinants to restaurant's employment level. A regression that takes into account these spatial elements and all other possible factors that may affect restaurant employment could give more clear and credible results.

It is important to note that the study does not conclude that smoking ordinances harm restaurant employment. In contrast the results of the a-spatial analysis show that no relationship between the two actually exists. Nor do the results of the spatial analysis imply a negative relationship between smoking ordinances and employment. What they do show is that variation in space of these ordinances is what can harm restaurant business. In other words the problem may not be the imposition of these policies, but that regulations are not uniform throughout space. And the key element that leads to this negative effect of spatial variability on restaurant business is that whereas the clients still have choices of dining in nearby restaurants with different smoking regulations, the restaurant owners do not have a choice in what smoking ordinance they have in their restaurants and on who are their customers.

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