

The Diffusion of Tobacco Control Policies: Theory and State-Level Empirical Evidence[†]

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Abstract

This paper analyzes spatial spill-over processes in two dimensions of tobacco control policies in the 50 US States and the federal District of Columbia for the years from 1991-2001. Drawing on political economy arguments of policy making by opportunistic governments in competing jurisdictions, I argue that smoke free air legislation is not spatially interdependent between jurisdictions, while cigarette taxation is. Furthermore, the theoretical considerations predict a level of regulation that is - ceteris paribus - negatively related both to the number of smokers and two measures of tobacco lobby power.

The empirical test of the model employs a state level data set of tobacco control policies for the years 1991-2001. Results are supportive of the hypotheses stated above.

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1. Introduction

Around the world, regulation of smoking is on the rise. Even countries like Italy that were once known for their almost complete lack of smoke free air laws have now adopted legislation that bans smoking in restaurant and bars. From a European perspective, these policies have a precursor: the United States of America. Smokers debarking their planes at one of the international airports of the East Coast are faced with harsh regulation rendering their desire for a post-flight cigarette into something close to desperation. Yet, smoking regulation differs vastly across US states. According to the data assembled for this paper, in 2001 state level smoking regulation was all but absent in Alabama, North Carolina and Wyoming. At the same time, California, Florida, Maryland, and Utah had enacted policies at levels of restrictiveness hitherto unknown (for details on data and sources see below). Vast differences across states also exist in with respect to taxation: In 2001, the inflation adjusted excise tax on cigarettes was 2.5 and 3 cents per pack in Virginia and Kentucky, respectively, while Alaska and Hawaii both levied taxes of 1 Dollar per pack.¹

In this paper I take up these observations and distinguish between two dimensions of smoking regulation: Smoking bans and restrictions, and cigarette taxation. The first dimension can be viewed as employment of "Command and Control" instruments, while the second dimension is more closely associated with the use of "Market based" policy instruments. I show that policy spill-overs that lead to spatial policy diffusion are present only in the case of cigarette taxes, but that jurisdictions enact smoking bans and restrictions independently. The results of this paper call for close

¹ To be sure, New York beats them all, with 1.11 US\$ excise tax per pack.

consideration of the underlying theoretical mechanisms that drive supposed spatial diffusion processes and interdependence across jurisdictions.

The remainder of this paper proceeds as follows. In section 1, I review part of the literature on smoking regulation and policy spill-overs. Section 2 identifies the actors in tobacco policy making and the degree to which these actors are interdependent across jurisdictions. The propositions from the theoretical part are taken to an empirical test with state level data on smoking regulation and cigarette taxes for the years 1991-2001. A final section concludes.

2. Smoking regulation in the literature

Enactment of smoke free air laws has received considerable attention in the literature. The main body of this work deals with the effects of smoking regulation rather than with its determinants. For instance, in a major review of research inquiring the effectiveness of smoking restrictions on tobacco use prevention in the United States, David Hopkins et al. (2001) identify 54 studies that were published between 1983 and 2001. The general pictures these studies convey is one of reduced cigarette consumption and mixed evidence on tobacco use prevalence. Caroline Fichtenberg and Stanton Glantz (2002) review 26 studies on smoke-free work place regulation and estimate that policies outright banning smoking at the work place reduce daily consumption of continuing smokers by 3.1 cigarettes.

The second type of regulatory policy, cigarette taxes, seems to be even more effective. Numerous studies have identified the negative impact of higher cigarette prices on cigarette consumption (e.g. Sung/Hu/Keeler

1994; Meier/Licari 1997; Centers for Disease Control and Prevention 1998; Hamilton et al. 1997 study the effect of tax *cuts* on cigarette consumption). Phrabhat Jha and Frank Chaloupka (1999) estimate that a 10 percent increase in the price of tobacco reduces consumption by four percent in high income countries.

Against the backdrop of this voluminous literature, comparatively few studies use smoking restrictions and tobacco taxes as their dependent variable. Yet, over the years, quite some evidence on the determinants of smoking restrictions and tax levels has been assembled. Unfortunately, the results appear contradictory at times. For example, while Joni Hersch, Alison del Rossi, and W. Kip Viscusi (2004) in their discussion of various state level anti-smoking regulatory measures find only a minor influence of the degree to which a state depends on revenue from tobacco agriculture, Harold Pollack and Peter Jacobson (2003) point to the influence of the tobacco industry in passing anti-discrimination laws protecting smokers in 30 states between 1989 and 1995². More directly, Fred Monardi and Stanton Glantz (1998) as well as Michael Givel and Glantz (2001), among others, identify tobacco industry influence on state legislatures via lobbying and campaign contributions.

Tobacco regulation in the two dimensions "restrictions and bans" and "taxes" has also been used as a prime example of policy diffusion. In general, this literature argues that the adoption of regulatory measures by one jurisdiction increases the likelihood that other jurisdictions will adopt similar measures (two of the "classics" in this field are Walker 1969, and Gray 1973). With respect to cigarette taxes, a number of studies have

² Such legislation is geared towards protecting smokers from discrimination, especially in firms' hiring policies.

found state tax levels to be highly interdependent. Michael Nelson (2002), for instance, identifies strong influences of adjacent states' tax level on state excise taxes on cigarettes and other commodities. Saba et al. (1995) and Coats (1995) provide a possible explanation for this observation: Cross-border shopping is a prime way to evade tax increases where geographically feasible. Possible diffusion effects of state level smoking restrictions and bans, on the other hand, are less frequently considered. In their account of diffusion processes between cities and states, Charles Shipan and Craig Volden (2005) note that the possibility of policy diffusion and policy spill-overs in this area of regulation is only rarely entertained. This is somewhat surprising given the burgeoning literature on diffusion in policy areas ranging from capital punishment (Mooney/Lee 1999) to same-sex marriage (Haider-Markel 2001).

The next section outlines some theoretical considerations pertaining to the determinants of state-level smoking regulation.

3. Theoretical considerations

As is standard in public choice accounts of policy implementation, I assume opportunistic governments that do not care about policy but only about political support. Political support comes in two flavors: campaign contributions from special interest groups and support from voters. Because the two sources of support are not independent, campaign contributions can be partially traded for votes, thus enhancing the probability of political survival (Grossman/Helpman 2001).

There are two types of voters, smokers and non-smokers. Depending on their identity as smokers or non-smokers, they derive utility from different consumption bundles. Voters who are non-smokers enjoy general

consumption together with smoke free air, while smokers derive utility from general consumption and unrestricted smoking opportunities.

The government provides public goods which are tax financed. State excise taxes on cigarettes reduce consumption opportunities for smokers, but not for non-smokers. Because it raises their real income, non-smokers are interested in high levels of cigarette taxation. The reverse is true for smokers.

How does this stylized set up translate into policy making in the two dimensions "smoking bans and restrictions" and "cigarette taxes"? If voters were the only relevant source of political support, we should expect an outright ban of all smoking in public (and, perhaps, in private settings as well) together with a level of taxation that maximizes revenue, because the median voter is almost certainly a non-smoker.³ Yet, if interest group influence is considered, this may no longer be true. Tobacco manufacturers and producers have high stakes in anti-smoking legislation. Given the effectiveness of both smoke free air laws and high cigarette prices, they stand to lose customers and revenue. Therefore, while the number of non-smokers should be positively related to both dimensions of regulatory policy, the reverse is true for the influence of tobacco manufacturers and producers.

Up to now, policy spill-overs have not been considered. Possible spatial interdependence between jurisdictions can be brought about by a number of mechanisms, including social learning and economic competition (Shipan/Volden 2005). Here, I focus on inter-jurisdictional competition for

³ The maximum share of smokers in the adult population across the 50 U.S. states and the District of Columbia between 1991 and 2001 was 31.7 percent in Kentucky 1996. Furthermore, smokers are less likely to vote than are non-smokers (Hersch et al. 2004).

mobile tax bases. Consider, first, the case of smoking restrictions and bans: A government enacting restrictive legislation in this dimension faces possible competition from governments of other states that seek to attract smokers. However, this seems not a very plausible mechanism given the high costs of relocation. Of course, the same holds true for considerations of creating "smoke free states" in order to attract non-smokers. Therefore, it is not clear where policy diffusion should stem from and we would expect no interdependence between smoke free air legislation in different jurisdictions . A different story can be told for cigarette taxes: If a government in one states sets taxes at a level that makes it worthwhile to buy cigarettes in states with lower levels of taxation, the government stands to loose revenue, and, therefore, political support because it has to tax non-smokers more heavily or reduce provision of public goods. Therefore, high taxes on cigarettes are only sustainable (*ceteris paribus*) if the state acts in a high-tax environment and/or the geographic location of the state makes it less attractive for smokers to buy their cigarettes elsewhere.

These propositions are taken to an empirical test in the next section.

4. Empirical estimates

4.1 Data and measurement

There are two different dependent variables in the empirical estimates conducted below: an aggregated index of state-level smoke free air legislation (SFAL), and the inflation adjusted state excise tax per pack. Both measures are taken from the study "Tobacco Control Policy and Prevalence Data: 1991-2001", published by ImpacTeen, an interdisciplinary research organization that specializes in youth substance abuse prevention

(ImpacTeen 2003). SFAL data assess the levels of restrictions that apply to smoking in the following places: Government worksites, private worksites, child care centers, health care facilities, restaurants, recreational facilities, cultural facilities, public transit, shopping malls, public schools, and private schools. To create the index used in this paper, the single scores were summed up, leading to a measure of SFAL restrictiveness with a theoretical maximum value of 41. The second dependent variable, state excise tax on cigarettes per pack, consists of the taxes levied by the states, adjusted for 2001 US Dollars.

As independent variables, I use the share of smokers in the adult population (Source: ImpacTeen 2003), the share of tobacco manufacturing of gross state product (GSP), and the share of receipts from tobacco agriculture of GSP. The last two variables are taken from the "State Tobacco Activities Tracking and Evaluation System (STATE)", provided by Centres for Disease Control and Prevention in the Office on Smoking and Health (OSH), National Centre for Chronic Disease Prevention and Health Promotion.

The data set thus obtained has a cross-sectional time series structure with the 50 states and the District of Columbia as units and the years 1991-2001 as time dimension. As estimation method, I use Prais-Winsten regressions with correlated panels and panel specific AR1-processes.

4.2 *Results*

As outlined above, political economy considerations lead to expect that SFAL and tax levels are in part jointly determined by the share of non-smokers in the population and the influence of pro-tobacco interest groups. In order to get a first clue whether this proposition can be deemed

valid, figure 1 shows a scatter plot of SFAL against inflation adjusted state excise taxes on cigarettes for the year 2001. As can be seen, states with low regulatory standards tend to levy lower taxes on cigarettes while highly regulated states levy high taxes. This is in line with theoretical expectations. Yet, the correlation between the two measures is less than perfect: In a bivariate regression, smoking regulation "explains" only about 20 percent of the variance in cigarette taxes.

(Figure 1 about here)

Additional covariates are included in models 1 to models 5, shown in tables 1 and 2. Model 1 and model 2 use the aggregated smoke free air law indicator as dependent variable, while models 3-5 estimate the effects of the covariates on state excise cigarette taxes.

In model 1, the percentage of smokers is negatively and significantly related to the restrictiveness of legislation. To address the issue of reverse causality, the share of smokers in the population was additionally included with a lag of one year. Both receipts from tobacco manufacturing and from tobacco agriculture enter the regression with negative signs and at significant levels. Additionally included are levels of taxes on cigarettes. State excise cigarette taxes show a positive influence on restrictiveness of regulation. The two policy instruments are complements rather than substitutes.

Model 2 addresses possible policy spill-overs between jurisdictions. The variable "Mean restrictiveness in adjacent states" is constructed by adding the levels of restrictiveness in adjacent states and dividing them by the number of adjacent states. Alaska and Hawaii are excluded from model 2 because of their isolated geographical location. The variable that captures levels of restrictiveness in neighboring states is estimated at statistically

insignificant levels. No interdependence could be detected, which confirms theoretical expectations. The coefficients of the other variables in the analysis remain basically the same.

(Table 1 about here)

Turning to models 3 to models 5 in which state excise tax was used as dependent variable, the most important difference can be found in the positive and significant effect of the mean tax levels in adjacent states. The higher neighboring states tax their smokers, the higher levels of taxation a state can sustain. To corroborate the proposed underlying mechanism of this effect, model 5 also includes the number of adjacent states. This measure enters the regression with a negative sign, rendering the proposition plausible that states with high taxes on cigarettes and many neighbors are subject to tax competition by cross-border shopping.

The measures of interest group influence enter the regression with the predicted sign. However, in model 5, the variable that captures receipts from tobacco agriculture is below significant levels.

(Table 2 about here)

For further diagnosis of spatial interdependence between jurisdictions, some standard spatial econometric test were conducted. These test lend support to the effects of the regression results: While no spatial interdependence could be detected for smoke free air legislation, substantial effects emerged for tax levels.

5. Conclusion

This paper has examined state level policy making with respect to smoking regulation in the dimensions smoke free air laws and cigarette

taxes. It was argued that spatial spill-over processes and, thus, policy diffusion should be expected only for the regulatory dimension of cigarette taxes, but not for smoke free air legislation. These expectations were developed against a standard political economy model of policy making in which governments are subject to the political demands of both interest groups and voters.

Summing up the empirical results, a clear picture emerges: States in which the tobacco industry is strong in terms of economic activity enact less restrictive smoking regulation and levy lower taxes on cigarettes than states in which the tobacco industry is less important. This can be interpreted as evidence for interest group influence and is in line with earlier research. The demand of non-smokers for smoke-free air is an important determinant of state level restrictiveness. Yet, a simple median voter model would fail to grasp the underlying political mechanisms by which demand from different groups is translated into policy. In all states, smokers accounted for less than a third of the adult population at any time. Possibly, provision of smoking opportunities is a more important issue for smokers than is smoke free air for non-smokers.

The results of this paper call for close consideration of the theoretical mechanisms underlying stipulated policy spill-over processes. If there are no externalities involved, we should not expect diffusion processes in the first place. Where spill over processes exist, they do not work independently from political interests and influences.

A next step along this line of research would consist of further corroborating the results presented in this paper by employing a dynamic model that includes spatial lags. Also, it would be interesting to see whether distance-based spatial weights instead of measures that only capture whether two states share a border produce different results.

From a normative perspective and assuming that smoking is deemed a bad thing, the results of this analysis call for a higher level of federal competences in setting tobacco taxes. Because states are subject to the logic of tax competition, regulation at higher levels of jurisdiction are required if high cigarette prices are what is politically desired.

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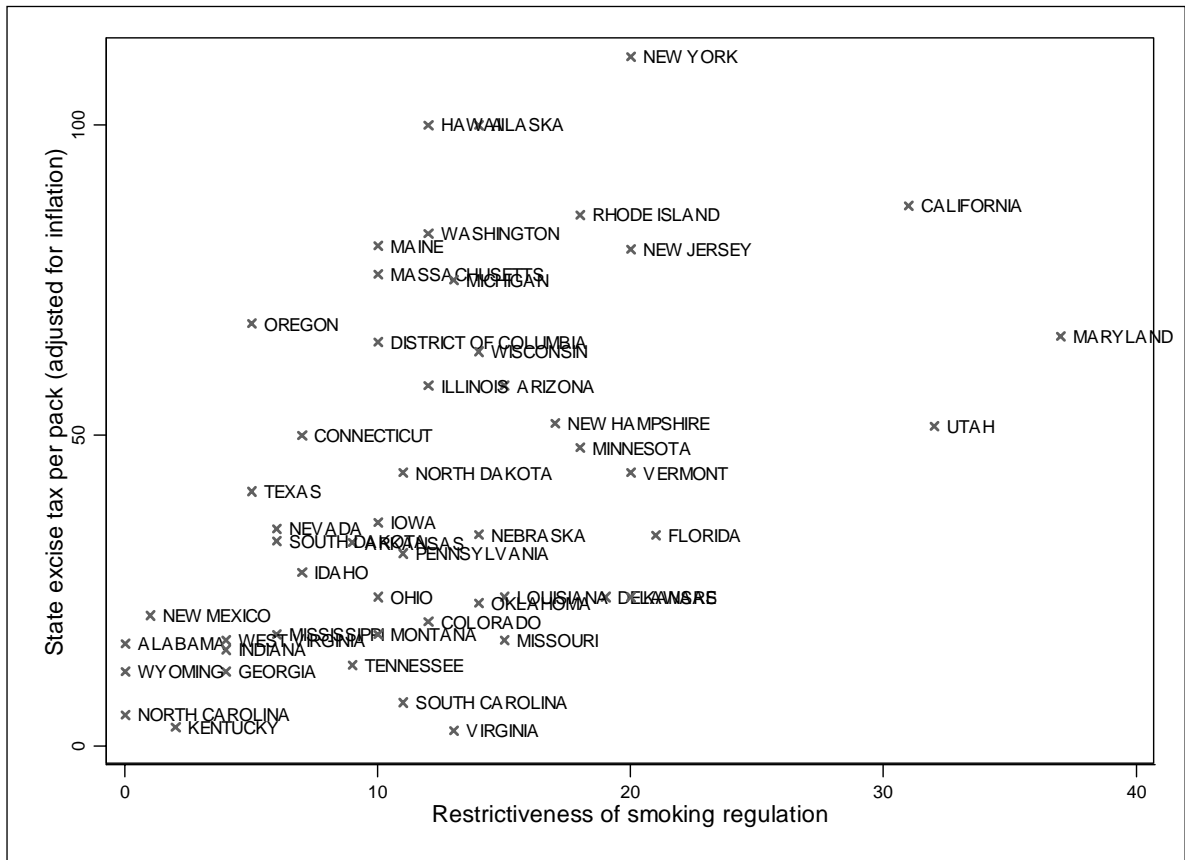


Figure 1: Two dimensions of regulation, US states 2001

| | Model 1 | Model 2 |
|--|----------------------|----------------------|
| Percentage of smokers | -0.163*** (-4.04) | -0.181*** (-4.28) |
| Percentage of smokers lag 1 | -0.130*** (-3.09) | -0.147*** (-3.30) |
| State excise tax, inflation adjusted | 0.043*** (5.12) | 0.057*** (5.71) |
| Revenue from tobacco manufacturing (% of GSP) | -0.938*** (-2.72) | -1.128*** (-3.97) |
| Receipts from tobacco agriculture (% of GSP) | -4.131*** (-5.13) | -2.939*** (-3.68) |
| Mean restrictiveness in adjacent states | | 0.039 (0.84) |
| Constant | 15.242*** (7.59) | 15.080*** (6.95) |
| N | 499 | 479 |
| R ² | 0.2627 | 0.2780 |
| Wald Chi ² | 144.47*** | 208.84*** |

Prais-Winsten-Regression with panel corrected standard errors and panel specific AR1 processes, z-statistics in parentheses.
* significant at 10%-level, ** significant at 5%-level, ***significant at 1%-level

Table 1: Empirical estimates of the determinants of Smoke Free Air Legislation

| | Model 3 | Model 4 | Model 5 |
|---|----------------------|-----------------------|----------------------|
| Percentage of smokers | -0.568 (-1.62) | -0.590** (-2.53) | -0.502** (-2.36) |
| Percentage of smokers lag 1 | -0.613* (-1.94) | -0.598*** (-2.60) | -0.492** (-2.33) |
| Smoke Free Air legislation | 0.364 (1.61) | 0.255 (1.13) | 0.186 (0.84) |
| Revenue from tobacco manufacturing (% of GSP) | -7.478*** (-7.33) | -5.305*** (-5.61) | -5.879*** (-5.51) |
| Receipts from tobacco agriculture (% of GSP) | -10.293** (-2.10) | -13.298*** (-3.44) | -3.863 (-0.92) |
| Mean tax in adjacent states | | 0.338*** (3.23) | 0.322*** (3.28) |
| Number of adjacent States | | | -4.103*** (-2.76) |
| Constant | 64.235*** (5.56) | 53.020*** (5.46) | 68.698*** (5.27) |
| N | 499 | 479 | 479 |
| R ² | 0.3622 | 0.4922 | 0.5147 |
| Wald Chi ² | 92.89*** | 111.67*** | 194.68*** |

Prais-Winsten-Regression with panel corrected standard errors and panel specific AR1 processes, z-statistics in parentheses.
* significant at 10%-level, ** significant at 5%-level, ***significant at 1%-level

Table 2: Empirical estimates of the determinants of state excise tax on cigarettes