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Public smoking bans and self-assessed health: Evidence from Great Britain

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ABSTRACT

Smoking bans in public places are considered an important public health intervention. The impact of such bans on health, and especially self-reported health, has not been widely considered in the literature. This paper investigates the impact of a public smoking ban on self-reported health status in Great Britain. We find that there are benefits for non-smoking women, but no benefits for smokers.

1. Introduction

Bans on smoking in enclosed public places have been implemented in numerous countries in the last 10 years. The driver has been the impact of smoking on health; the Centres for Disease Control and Prevention estimate that smoking causes 443,000 deaths annually in the US, more than from human immunodeficiency virus (HIV), illegal drug use, alcohol use, motor vehicle injuries, suicides, and murders combined (CDC, 2011).

There is a growing literature evaluating the impact of smoking bans[1] on smoking behaviour and exposure to second hand smoke (e.g. Scollo et al., 2003; Abadie et al., 2010; Adda and Cornaglia, 2010 and Anger et al., 2011). However, despite there being some form of anti-smoking legislation in more than 90 countries, there is little evidence demonstrating the impact of such non-price based legislation on health (Goel and Nelson, 2008), notable exceptions for the US are Adams et al. (2013) and Shetty et al. (2011) both of whom find small beneficial impacts.

The paper is unique because it provides evidence on self-reported health using panel data from the England and Scotland. England and Scotland provide an ideal location for a natural experiment because of their similarities. We find evidence that the smoking ban does improve health, but only for female non-smokers.

2. Smoking bans and health

Public smoking bans have a number of potential health benefits. Sargent et al. (2004), widely cited as demonstrating the effectiveness of smoking bans, found that admissions for myocardial infarction fell from 40 to 24 during six months of a smoking ban. However, in common with much of the literature evaluating smoking bans, this study is affected by a small sample size and difficulties in accounting for other covariates and unobservable heterogeneity (Adams et al., 2013).

Intuitively, bans may be expected to encourage individuals to change their smoking behaviour, either by quitting or by reducing smoking intensity. However, the literature has found a limited effect on smoking behaviour (Anger et al., 2011; Jones et al., 2011). It may be that individuals substitute away from smoking in public places towards private places (Adda and Cornaglia, 2010). Another benefit may be the reduction in exposure to second-hand smoke. There is evidence that exposure has fallen following public smoking bans (Haw and Gruer, 2007). There may also be unforeseen negative impacts from bans. Wildman and Hollingsworth (2010) find evidence of increasing body mass index in Australia resulting from the implementation of a ban.

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[1] There is a literature on banning the advertising of smoking and consequent effects, see Chaloupka and Warner, 2000.

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This paper uses a household panel from Great Britain to investigate the impact of a public smoking ban on health. This approach provides a large sample size, it allows us to control for observable confounders, and for unobservable heterogeneity. The focus is on self-reported health: if smoking bans are successful then we would expect to see improvements in self-reported health.

3. Empirical approach

We use the implementation of public smoking bans in England and Scotland as a natural experiment to estimate the causal effect of smoking bans on self-reported health. Scotland introduced a smoking ban in March 2006 (England followed in July 2007). This time difference is used to provide treatment (Scotland) and control (England) groups. A key issue for a natural experiment is whether other factors, such as cigarette taxes, are changing differently for the treatment and control groups. In Great Britain (which contains Scotland and England), cigarette taxes are set centrally and are the same for both Scotland and England. This means that our results are unlikely to be contaminated by other confounding factors during the period in question.

Using panel data we are able to estimate individual level models using fixed effects to control for unobservable heterogeneity. The estimating equation is:

$$\text{Health}_{it} = \alpha_i + \beta_1 T_t + \beta_2 SB_i + \tau\, T \cdot SB_{it} + X_{it}\gamma + \upsilon_{it}, \quad (1)$$

where Health_{it} is the outcome of interest, SB_i demonstrates whether an individual was exposed to a smoking ban (in this case residing in Scotland), T_t is a time effect common to both groups, X_{it} is a matrix of control variables. α_i is an individual fixed effect and υ_{it} is the idiosyncratic error term. The treatment effect is identified as the parameter τ.

4. Data

We use data from England and Scotland from the British Household Panel Survey (BHPS), a panel survey which has run since 1991. The introduction of the smoking ban in Scotland in 2006 coincides with wave 16 of the BHPS. Wave 1 consisted of over 5000 households providing around 10,000 individual interviews from England and Scotland. We use a balanced panel of individuals from wave 1 (1991) to wave 16 (2007) and make use of the range of data on demographic and household characteristics including health, income, marital status, labour market outcomes and smoking behaviour. Summary statistics are given in Table 1.

5. Model specification

Our outcome measure is self-assessed health (SAH). In all waves (except wave 9 (1999)) individuals were asked "Please think back over the last 12 months about how your health has been. Compared to people of your own age, would you say that your health has on the whole been …Excellent, Good, Fair, Poor or Very Poor".[2] This variable is dichotomised into a variable indicating good health (respondents answering excellent or good).

As a robustness test we chose the presence of a limiting health condition as an alternative measure of health that should not be affected by a smoking ban. It would be unlikely for a smoking ban to have an impact on limiting health conditions and so we would expect any treatment effect to be lower for this measure, and perhaps insignificant.

[2] In wave 9 individuals were asked "In general would you say your health is …Excellent, Very good, Good, Fair or Poor". Models are estimated including and excluding wave 9 and the results are unchanged.

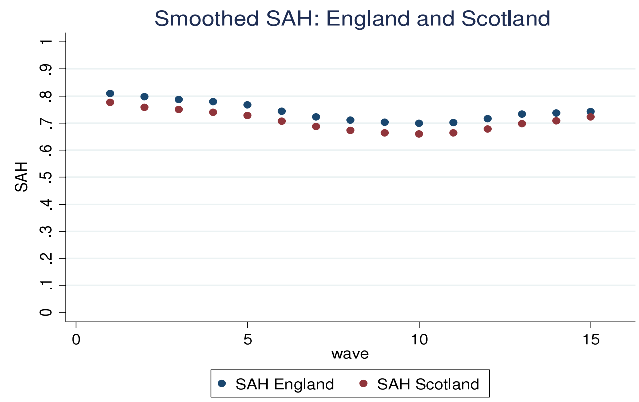

Fig. 1.

As a further test we also estimate a model based on a false treatment variable. Instead of estimating (1), using the time of the treatment for the interaction, we define a new treatment variable that uses the time period prior to the treatment intervention. We would expect that this would produce results which were close to zero and insignificant.

We estimate separate models for individuals who have never smoked and individuals who have smoked at some point during the life of the panel.[3] We estimate the model for individuals under the age of 60. Adams et al. (2013) suggest that it is preferable to stratify the estimation according to age, partly due to the different behaviours of different age groups.

We also include controls for age, marital status, labour market outcomes, income, household size, number of children and a time trend. A common time trend between the treatment and control groups is a key identifying assumption for the difference-in-differences approach. Fig. 1 shows the smoothed averaged SAH for England and Scotland from wave 1 to wave 15. It demonstrates a common time trend between the two countries.

6. Results

The first row in Table 2[4] suggests that the public smoking ban had no impact on the whole sample, but that there were benefits for those individuals who had never smoked. The probability of reporting good health increased for non-smokers by almost 10%. The fact that there was only a treatment effect for non-smokers suggests that the benefits may have come from a reduced exposure to second-hand smoke. As the literature suggests that bans have little or no impact on smoking behaviour, it is unsurprising to find that individuals who had smoked at some point during the panel saw no improvement in SAH.

The robustness checks in the lower two rows of Table 2 support these models. Using a health condition which should, at least in the short-run, be unaffected by the smoking ban we find no significant treatment effect. The estimated treatment effects are negative, all less than 3% with relatively large standard errors. The use of a false treatment effect, based on the period prior to the smoking ban, also produces an estimated treatment effect that is small and insignificant.

Finally, the treatment effect is estimated separately for men and women (Table 3). We find a significant treatment effect for women who have never smoked. The introduction of the smoking ban increased the probability of reported good health by 12% for

[3] It would have been preferable to estimate the models according to smokers and quitters but the sample sizes were too small.

[4] The models were estimated using OLS and all models include a full set of controls. The limiting condition variable was not reported in waves 9 and 14.