Smoking Behaviour and Life Satisfaction: Evidence from the UK Smoking Ban

Timothy Hinks and Andreas Katsaros

Abstract: We use three waves of the British Household Panel Survey to examine whether changes in smoking behaviour are correlated with life satisfaction and whether the recent ban on smoking in public places in England, Wales and Northern Ireland has affected this relationship. We find that smokers who reduced their daily consumption of cigarettes after the ban report significantly lower levels of life satisfaction compared to those who did not change their smoking habits, with heavy smokers particularly affected. No such finding is reported for previous years.

I.   Introduction

Theoretical work on the economic theory of addiction by Becker and Murphy (1988) provides a reasoning behind people's decision to consume addictive and medically harmful substances such as cigarettes. Becker et al (1994) finds support for rational addiction of smokers. Alternatively Gruber and Mullainathan (2005) find that the average smoker in the United States gains greater life satisfaction with higher excise duty on cigarettes rather than the a priori of lower satisfaction as price rises. This finding rejects the rational addiction model and instead favours the explanation that smokers perceive taxation to be a way of being protected by government against themselves. In this letter we extend the literature on the economics of smoking by providing empirical evidence on the hitherto unexplored relationship between life satisfaction and a national ban on smoking. In England, Wales and Northern Ireland national smoking bans came into force between April and July 2007 having been previously pioneered in Scotland in 2006. The smoking ban prohibited smoking in all public places such as public houses, bars, restaurants and work places.

According to the Smoking Related Behaviour and Attitudes Survey (ONS, 2008) the majority of smokers agreed with the ban in most public places (e.g. at work, restaurants and public indoor areas). However the one venue where the majority of current smokers (54 per cent) did not agree with smoking restrictions was in pubs (ONS, 2008, Table 7.2, p. 84). There has been a switching of customers in pubs away from smokers towards non-smokers, with 25 per cent of smokers in 2008-09 frequenting the pub less often than before the ban and 19 per cent of non-smokers frequenting the pub more often. At the same time there has been no discernible

change in behaviour towards smokers smoking in the presence of non-smokers (ibid, Table 6.11, p. 76), with the majority of smokers smoking less or not at all. This indicates that the majority of smokers consider the health of others and are aware of the negative externalities such as passive smoking. However a smoking ban particularly in pubs imposes a change on their behaviour and could correlate to diminished perceptions of freedom of those who choose to smoke as well as increasing the stigmatizing of smokers. Whether these effects are persistent is an empirical question and one which this letter cannot address for the case of England, Wales and Northern Ireland due to a lack of more recent data.

A smoking ban could be considered to be a negative shock to smokers under Becker's theory of addiction. Previous research on shocks in the happiness literature suggests that individuals tend towards some 'set-point' of happiness following shocks[1]. In this paper a ban would have an initial negative shock on smokers but in time (say after 1-3 years) this shock would be purely transitory. It is questionable whether the smoking ban could be considered to be a genuine shock given the publicity that surrounded the ban prior to its introduction. However, uncertainty over who would monitor and enforce the ban could have still meant a shock to smokers. Another negative effect on smokers from the ban, and separate to the transitory shock argument is the positive social externality of being a smoker. For all these reasons, a finding that life satisfaction is reduced because smokers feel they are forced to reduce the number of cigarettes they consume because of the smoking ban, may not be surprising. Alternatively, if a tax on cigarettes is perceived by smokers as government somehow taking care of them, then a complete ban on cigarettes in public places may have a positive effect on smokers' happiness in line with the work of Gruber and Mullainathan (2005).

II.   Data and Analytical Framework

Our data is derived from the British Household Panel Survey. This is a nationally representative survey of some 5500 private households, comprising approximately 10000 individuals. Information on life satisfaction is gathered by asking the question "How dissatisfied or satisfied are you with your life overall?", with answers ranging

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[1] Lucas et al (2004) calls this a set point, while it is termed the hedonic treadmill by Brickman and Campbell (1971).

from 1 (not satisfied at all) to 7 (completely satisfied). Although in the BHPS there are eighteen available waves, we use only data from the 2005, 2006 and 2007 surveys for reasons of space. What makes this data so applicable to the question of how the smoking ban affected individuals' life satisfaction is its collection in September of every year. The panel nature of the BHPS greatly assists our effort since a large percentage of those questioned in 2006 were also interviewed in 2007. Consequently we are in the position to measure whether a respondent increased or decreased the number of cigarettes smoked per day. For robustness we have also modelled earlier waves of the BHPS prior to 2006 in order to test whether there are any systemic changes in smoking behaviour in September of every year. There is no reason there should be, but then if any change does occur in September 2007 then it is more likely capturing the impact of the smoking bans[2].

Our analytical approach begins with the identification of 3 distinct categories that capture different types of smoking behaviour amongst smokers.

1. If the respondent increased the daily number of cigarettes between '*t*' and '*t+1*'.
2. If the respondent decreased the daily number of cigarettes between '*t*' and '*t+1*'.
3. If the respondent did not change the daily number of cigarettes between '*t*' and '*t+1*'.

The reference group is no change in cigarette consumption. The other categories capture *changes* in behaviour. We are not modelling the decision to start or stop smoking. We are not modelling a two step process of whether someone smokes or not and if they do how many they smoke. This paper is concerned about changes in behaviour of smokers.

We continue by deploying an *ordered probit* model separately for 2006 and 2007 in which life satisfaction is the independent variable and is regressed against the smoking status variables as seen in equation (1). The model also includes several

[2] These results are available from the authors upon request.

core variables from the life satisfaction literature, such as employment status, adult equivalent household income, and the age and age-squared of the individual.

$$(S_{it} \mid Smo \text{ ker } in \ t-1 \ and \ t) = \alpha_{it} + \beta_{1t} Increase \ Smoke_{it} + \beta_{2t} \text{Re } duce \ Smoke_{it} + \psi_{it} X_{it} + \varepsilon_{it}$$

III. Descriptive Statistics and Results

The descriptive statistics are presented in Table 1. Of particular interest to us is the finding that the share of smokers who *decrease* their cigarette consumption increases to 32.4 per cent in 2007 relative to 26.1 per cent in 2006 and 28.1 per cent in 2005. When we looked back at previous years we find that the increase in smokers who reduced their cigarettes was highest in the 2006-2007 period with 6.3% more smokers in this category (see Figure 1).

Figure 1
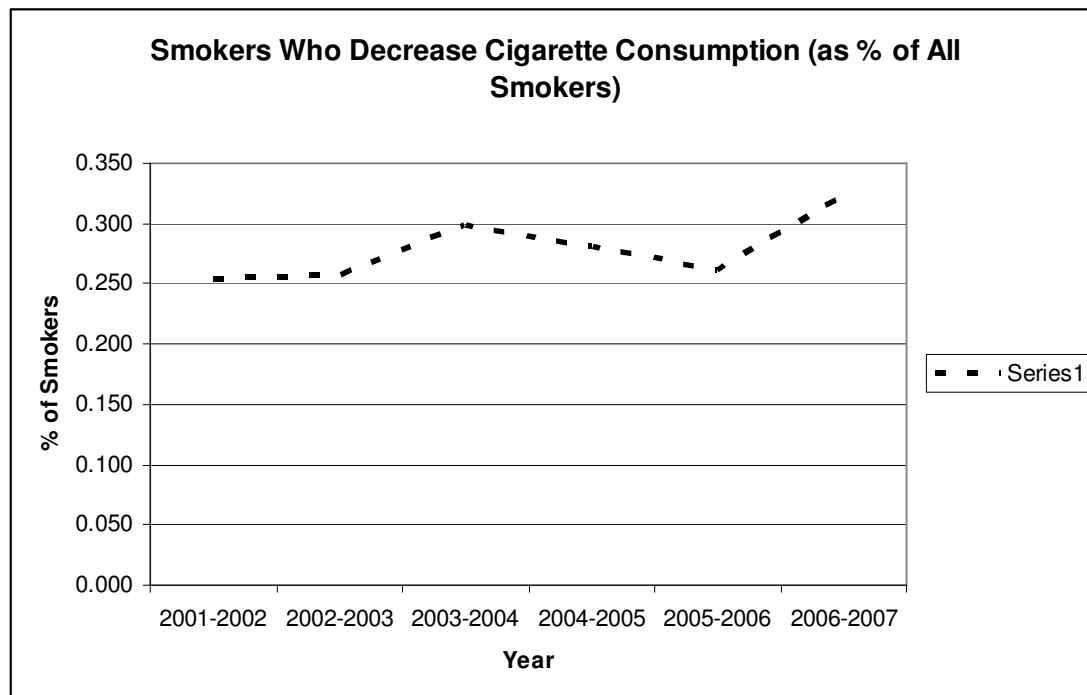
The regression results for 2005, 2006 and 2007 are presented in Table 2. In all years the age and age-squared terms reveal a U-shaped relationship with life satisfaction confirming previous findings. The economic status variables are significant too, with the self-employed, employed, those on maternity leave and those who are retired all reporting significantly higher levels of satisfaction compared to the unemployed,

ceteris paribus. The most surprising result is that of the adult equivalent gross household income term that is insignificant in all three years although is always positive. Previous years of data indicates that this term can vary in significance but is always positive in sign[3].

For smokers we observe no significant effect of a change in the quantity of cigarettes consumed on life satisfaction between 2004-05 and 2005-06. When smokers reduce the number of cigarettes between 2006 and 2007 they report lower levels of satisfaction relative to smokers who consume the same number of cigarettes though only at the 10 per cent level. This is consistent with the idea that smokers feel their individual liberties are threatened by the ban. Given the evidence from the Smoking and Behaviour Survey it is likely this threat to their liberties is felt most by the banning of smoking in pubs. Results not reported here use job satisfaction of employees instead of life satisfaction in order to observe whether the smoking ban in the workplace has affected job satisfaction. There is no significant correlation between the smoking variables and job satisfaction. When earlier waves are used this finding is not observed. Since we do not have access to the 2008 wave we cannot see if this finding persists.

In order to understand if there are differences amongst smokers we divide the group into heavy (those who smoke 10 or more cigarettes a day) and light smokers (those who smoke less than 10 a day). The results in columns 2, 4 and 6 in Table 2 indicate that only in 2007 do heavy smokers who reduce their intake of cigarettes report significantly lower life satisfaction than heavy smokers who smoke the same amount. This result is expected given the ban will affect those who smoke heavily more than those who do not. We would expect this since a ban will force heavy smokers to change their behaviour more relative to light smokers.

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[3] For Waves 1-16 there is a net household income data set available from ISER (Study No 3909). Given we are concerned particularly with 2007 this is unfortunate. When we ran the same models with the adult equivalent *net* household income for 2002 to 2006 the results were similar to when using the gross figure. The results are available upon requests from the authors.

IV. Final Comments

This paper finds a correlation between smokers reducing the amount of cigarettes they consume in the face of a smoking ban in public places and that this change in behaviour adversely affects their life satisfaction. That this behaviour is actually good for their health is either not considered or is overtaken by the feeling that their right to smoke (particularly in public houses) has been seriously affected and that life satisfaction declines as a result.

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Table 1 Descriptive Statistics

	2005		2006		2007	
Variable	Mean	Std Err	Mean	Std Err	Mean	Std Err
Life Satisfaction	4.860	1.412	4.907	1.371	4.891	1.416
Log Household Income (Adult Equivalent)	6.759	0.655	6.826	0.645	6.846	0.668
Smoker increases cigarette consumption	0.272	0.445	0.313	0.464	0.239	0.427
Smoker decreases cigarette consumption	0.281	0.450	0.261	0.439	0.324	0.468
Smoker does not change behaviour	0.447	0.497	0.426	0.495	0.437	0.496
Age	44.249	14.980	45.246	15.035	46.301	14.836
Age-Squared	2182.184	1450.471	2273.101	1492.139	2363.766	1498.241
Male	0.449	0.498	0.456	0.498	0.431	0.495
Self-Employed	0.067	0.249	0.071	0.258	0.070	0.255
Employee	0.543	0.498	0.538	0.499	0.523	0.500
Retired	0.140	0.348	0.148	0.356	0.152	0.359
Maternity Leave	0.003	0.051	0.003	0.059	0.002	0.043
Family Care	0.098	0.297	0.101	0.302	0.099	0.298
Sick	0.090	0.287	0.082	0.274	0.102	0.303
Government Training Scheme	0.001	0.026	0.001	0.037	0.001	0.035
Full-Time School	0.013	0.114	0.007	0.083	0.008	0.090
Unemployed	0.046	0.210	0.047	0.212	0.043	0.204
Married	0.616	0.487	0.620	0.486	0.639	0.481
Widowed	0.051	0.221	0.055	0.228	0.049	0.216
Single	0.191	0.393	0.189	0.392	0.173	0.379
Separated/Divorced	0.142	0.349	0.135	0.342	0.138	0.345
England	0.581	0.493	0.574	0.495	0.569	0.495
Wales	0.209	0.407	0.220	0.414	0.225	0.418
Northern Ireland	0.210	0.407	0.207	0.405	0.206	0.405

Table 2 **Ordered Probit Regressions**

	2005		2006		2007	
	(1) All Smokers	(2) Heavy Smokers, >9 cigarettes a day	(3) All Smokers	(4) Heavy Smokers, >9 cigarettes a day	(5) All Smokers	(6) Heavy Smokers, >9 cigarettes a day
Log Household Income (Adult Equivalent)	0.012	0.025	0.040	0.007	0.025	-0.042
Smoker increases cigarette consumption	0.107	0.080	0.051	0.010	-0.044	-0.007
Smoker decreases cigarette consumption	-0.019	-0.108	0.057	0.045	-0.101*	-0.122*
Age	-0.019	-0.036**	-0.029**	-0.035**	-0.016	-0.021
Age-Squared	0.000**	0.000***	0.000***	0.001***	0.000*	0.000**
Male	-0.007	0.016	0.074	0.088	0.076	0.126*
Self-Employed	0.592***	0.529***	0.628***	0.526***	0.423***	0.474**
Employee	0.535***	0.440***	0.671***	0.591***	0.445***	0.490***
Retired	0.416**	0.406**	0.429**	0.264	0.534***	0.462***
Maternity Leave	0.888*	1.068	0.658	1.057	1.277**	0.425
Family Care	0.312**	0.212	0.544***	0.421**	0.136	0.096
Sick	-0.345**	-0.454*	-0.200	-0.292*	-0.543***	-0.443***
Government Training Scheme	-1.382	-1.454	0.443	0.440	0.171	1.253
Full-Time School	0.607**	0.502	0.778**	1.164**	0.678**	0.772**
Married	0.488***	0.486***	0.482***	0.495***	0.319***	0.314***
Widowed	0.402***	0.372**	-0.026	0.033	-0.123	-0.229

Single	0.282***	0.214*	0.323***	0.368***	0.108	0.146
England	-0.186***	-0.206**	-0.108	-0.073	-0.118	-0.084
Wales	-0.231***	-0.203**	-0.073	-0.163*	-0.068	-0.126
Observations	1,517	1,057	1,442	1,076	1,591	1,182
Log likelihood	-2479.122	-1722.418	-2327.705	-1747.452	-2596.588	-1920.498
Pseudo R2	0.037	0.044	0.041	0.043	0.040	0.041

Note: Reference group are smokers who do not change the number of cigarettes they smoke daily, who are unemployed, separated/divorced and living in Northern Ireland.
*, **, *** indicates statistical significance at the 10, 5 and 1% level.