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The smoking wage penalty in the United Kingdom: Regression and matching evidence from the British Household Panel Survey

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Abstract

This paper considers the impact of tobacco consumption on wages in the UK using data from fifteen waves of the British Household Panel Survey. Considering both overall smoker status as well as the number of cigarettes consumed, we provide estimates for the smoking wage penalty using standard regression methods, including panel estimators for fixed effects and panel instrumental variable estimators. Furthermore, we analyse the impact of stopping and starting to smoke relative to permanent smokers and non-smokers by Mahalanobis-matching. In the cross-section, we find a rather large wage penalty for smokers of about 4%. However, panel estimator and IV results show relatively few support for hypotheses linking the smoking wage penalty to either lower productivity of smokers, be it health related or not, or discrimination. Matching results suggest that starting or stopping to smoke does not affect later earnings relative to remaining either smoker or non-smoker.

Keywords: Smoking wage penalty, United Kingdom, discrimination
JEL Classification: J31, J71

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1 Introduction

A number of studies have found a rather large wage penalty as high as 24% associated with tobacco consumption. This papers tests several hypotheses regarding this smoking wage penalty. Relying on data from the British Household Panel Survey (BHPS), we test whether the wage penalty can be explained by either discrimination of smokers, productivity differences, worse health of smokers or whether there are unobserved factors related to both smoking and lower earnings. Our findings do not support the first three hypotheses, but rather suggest that the smoking wage penalty is related to unobserved heterogeneity.

The fact that smokers seem to earn relatively less than non-smokers, even after accounting for differences in observables, has been documented in a number of empirical studies. In an early study using cross-sectional data from the 1973 Quality of Employment Survey, Leigh and Berger (1989) find no significant relationship between either smoking or being overweight and current earnings. Levine, Gustafson and Velenchick (1997) use data from two waves of the National Longitudinal Survey of Youth for 1984 and 1992. Their findings from two cross-sectional regressions and time and sibling-differenced models show a 4% to 8% wage penalty for smokers with larger effect being found for females. Using data from the 1998, 1999 and 2001 waves of the German Socio-Economic Panel, Heineck and Schwarze (2003) find a wage penalty for smoking men in the cross-section that disappears when controlling for unobserved heterogeneity. Using the 2002 wave of the same data set, Anger and Kvasnicka (2006) compare current smokers with past-smokers and never-smokers. Their results from OLS and 2SLS-estimations, using smoking at 16 and co-residence with a (former) smoker as instruments, reveal a 4% to 10% percent wage penalty for current smokers and a 3% to 4% wage premium for past smokers.

There has also been a stream of papers analysing the impact of both drinking and smoking (Auld 2005 for Canada, Lee 1999 and Lye and Hirschberg 2004 for Australia, van Ours 2004 for the Netherlands). A general finding from this literature implies that while positive effects are found for drinking, smoking is generally related to an often large wage penalty of about 10% with some estimates ranging as high as 24%. Recent research has also focused on the labor market effects of the consumption of other drugs (van Ours 2006, 2007)

There are four common hypotheses used to explain wage differences between smokers

and non-smokers (see e.g. Levine, Gustafson and Velenchick 1997). First, there may be discrimination against smokers. During the last decades, public opinion on smoking has shifted from considering it as an everyday-activity to seeing it as an unhealthy disturbance with some researchers even speaking of outright hostility toward smokers (Levine, Gustafson and Velenchick 1997, p. 493). As far as either superiors, customers or co-workers object against working alongside smokers, it seems possible that smokers are only able to find work at lower wages as predicted by taste-discrimination (Becker 1957/1971). Similarly, employers could consider smoking to be a signal of an individual's lower productivity or "inner strength" which may lead to statistical discrimination (Phelps 1973, Arrow 1973).

Second, there is evidence that smokers are indeed less productive than non-smokers which might translate into earnings differences. For example, smokers may be less present at their workplace due to smoking breaks which may be particularly problematic if the production process involves work on assembly lines or work in teams. Some of the evidence on this topic is summarized in Kristein (1983) who estimates the productivity costs of smoking (in 1980 dollars) at between 80$ and 160$ per individual and year with additional 40$ to 80$ imposed by higher absenteeism.

Third, as smoking is adversely related to health, smokers may receive lower wages as a consequence of lower productivity related to poorer health. One argument suggests that the adverse health effects of smoking directly reduce productivity as smokers are less able to carry out physically demanding tasks like manual work. A similar argument suggests that employers may only be willing to pay lower wages to smokers due to the latter's higher absence from work (see Kristein 1983, Bertera 1992, Ryan, Zwerling and Orav 1992 and Bush and Wooden 1995 for an analysis of the relationship between smoking and work absenteeism).

Finally, there may be unobserved factors related to both smoking and lower wages. Becker and Murphy (1988) and Becker, Grossman, and Murphy (1994) argue that smoking may reflect a higher time preference rate as smoking may provide utility today with the adverse effects occurring much later in life. A higher time preference rate is then related to differences in investment in education or training which in turn has consequences for productivity and wages. Other possibilities include differences in the preferences for work and leisure or differences in other unobservables. Note at that point that only the first

three hypotheses are related to causal effects of smoking, while the last effectively points toward spurious correlation between smoking and wages in the cross-section that is caused by omitted variables.

The contributions of this paper are as follows: First, we use for the first time a long panel that allows us to relate yearly changes in smoking behavior to wage changes over a period of fifteen years. This enables us to control for both time constant heterogeneity as well as correlation between tobacco consumption and the contemporaneous error term using panel (instrumental variables) estimators. As our data allows the use of past consumption as an instrument for current consumption, our IV-estimates seem to be less problematic than those reported in the previous literature (see the critical discussion of the validity of instruments in Heineck and Schwarze 2003 and van Ours 2004). Furthermore, we use the fact that we observe individuals over a long time to contrast individuals starting or stopping to smoke with both permanent smokers and permanent non-smokers using Mahalanobis-matching. Finally, as the public reaction to smokers differs between countries, estimates for another country may be helpful in disentangling the causes of the smoking wage penalty. In this context, the UK is an interesting case as the British and American labor markets are relatively similar, while the reaction to smokers may be expected to be stronger in the US.

This paper is organized as follows. Section 2 presents the data used in this study. The estimation strategy is lined out in section 3, while descriptive evidence is presented in section 4. Econometric results are found in section 5. Section 6 concludes.

2 Data

This paper uses data for the years 1991 to 2005 from the first fifteen waves of the British Household Panel Survey (BHPS), an annual survey currently carried out by the ESRC UK Longitudinal Studies Centre within the Institute for Social and Economic Research at the University of Essex.[1] The target population of the first wave of the survey were adult members of households with a domestic residence in England, Scotland south of the Caledonian Canal and Wales. In later waves, households that moved into Scotland north

[1] See http://www.iser.essex.ac.uk/ulsc/bhps/ for detailed information and documentation.

of the Caledonian Canal or from domestic residence into institutions (excluding prisons) were followed. Beginning with wave four, there has also been a youth survey targeted at 11 to 15 year old individuals that is not used in this paper.

While the original sample consisted of 8,167 household, new samples were added in later years. From wave seven to wave eleven, a sub-sample of the original British European Community Household Panel was incorporated. Additionally, boost-samples for Wales and Scotland were added in in wave 9, while a Northern Ireland sample was added in wave 11.

In this paper, we focus on information on the individual level and use only some of the available household information. Using information from all subsamples, we first restrict the sample to those in prime working age from 20 to 55 years. This allows us to largely ignore issues like early-career on-the-job-training, while the restriction to 55 years provides some protection against selectivity issues due to sick smokers dropping out of the labor force. Furthermore, we restrict the sample to employees with a typical weekly working time of at least 30 hours, excluding the self- and part-time employed. As there are a few cases with rather extreme working hours, we drop the top 1%, effectively resticting the sample to those with a typical weekly working time between 30 and 60 hours.

After dropping cases with missing values and splitting the sample by gender, we arrive at 33,313 observation for 6,647 individuals for the male sample and 23,546 observations for 5,611 individuals for the female sample. Detailed information on both sub-samples can be found in tables 5 and 6 in the appendix. Note at this point that the data does not contain information on alcohol or drug consumption.

3 Econometric model

In a first step of the econometric investigation, we use the regression techniques usually applied in the literature on the smoking wage penalty. To fix ideas, consider a simple Mincer-type earnings regression of the form

$$y_{it} = \beta' X_{it} + \tau * s_{it} + \eta_i + \epsilon_{it}, \tag{1}$$

where y_{it} is the log monthly wage in 1987 prices of individual i at time t, η_i is a person-specific fixed effect and ϵ_{it} is a error-term. X_{it} contains time-varying control variables,

more specifically a third-order polynomial in age, the number of children and dummy-variables for marital status, education, the number of employees at the workplace, union-membership, employer-type (private company, local or central government), region of residence, socio-economic class of the current job (including some control for industry) and year of observation. Note that by including dummies for occupation class, we implicitly rule out the possibility that discrimination against smokers prevents them from working in certain occupations. However, as smokers are essentially found in (almost) all occupations and on all hierarchical levels, this assumption seems relatively innocuous. In some (cross-sectional) specifications, we also include dummies for being of Indian, Pakistani or Bangladeshi heritage and for being non-white. s_{it} contains information on the smoking behavior of the respective individual at time t and τ is our parameter of interest.

The first measure of smoking behavior is a simple dummy variable, being "1" if a person answers "yes" to the Question "*Do you smoke cigarettes at all nowadays?*" (wave I) or "*Do you smoke cigarettes?*" (all other waves) and "0" otherwise. However, there are various reasons why not only the pure fact that an individual smokes might be relevant for wages, but that the quantity of tobacco consumption matters: First, adverse health effects are obviously stronger for heavy than for light smokers. Second, we might expect that a potentially lower productivity of smokers due to a higher number of breaks is directly related to the number of cigarettes smoked during the day. Similarly, possible discrimination obviously depends on the possibility that co-workers are aware of an individual's smoking behavior which seems more likely the more an individual smokes. To capture these possible effects, we use a second measure of tobacco consumption, specifically the number of cigarettes typically smoked per day. To allow for non-linear effects, we also include a squared term.

Note that there are several econometric problems when trying to identify τ. First, as already noted there may be unobserved factors, e.g. time preference rates or other preferences, that are correlated with both smoking and wages. As far as these can be treated as time-constant, the use of fixed effect panel estimators allows consistent estimation of τ. However, while this seems to be an innocuous assumption when dealing with preferences, there is also a second source of endogeneity. If tobacco consumption is correlated with the contemporaneous error, the usual fixed effects estimator does not lead to consistent estimation of τ. Unfortunately, there are various reasons why such a correlation might

arise. To fix ideas, consider an individual that receives an promotion accompanied by a raise in wages or the opposite case where an individual is forced to switch to a worse paid job to avoid unemployment. Both of these cases can be expected to be accompanied by a certain level of stress that may in turn influence tobacco consumption. As we cannot fully control for such events, our smoking measure is most likely endogenous, even conditional on the unobserved individual fixed effect.

As a simple solution to this problem, we use an alternative model where we instrument current tobacco consumption with one year lags. In this model, we first purge the unobserved fixed effect by first differences and then use two-step GMM with the aforementioned lags as instruments.[2] Tests for the validity of the instruments confirmed the absence of weak instruments problems with the lowest observed value for the Kleibergen-Paap rk Wald F statistic being 43.397 and the typical value being larger than 100. For males, we were also able to calculate an overidentified model using first and second lags of tobacco consumption, which indicated no problems with the exogeneity of the instruments as the tests could never reject the null of instrument exogeneity with p-values usually around at least 0.8. Unfortunately, this model could not be calculated for females as the number of cases became to low.

To test the various hypotheses on the relationship between tobacco consumption and wages, we estimate various versions of equation (1) separately for men and women. First, a simple comparison of the OLS estimates using the pooled cross-sectional data with the panel and IV-estimates provides guidance on the importance of unobserved factors in explaining the smoking wage penalty. Second, we estimate equation (1) with and without controlling for (self-assessed) health. Note that controlling for health and unobservables implies that the wage effects of smoking are completely related to either productivity differences not related to health, e.g. a lower average working time of smokers due to smoking breaks, or to discrimination. A comparison of the estimates for τ in these models with the estimate for τ in the models without controls for health, allows us to assess the relative importance of health related differences between smokers and non-smokers in the determination of the smoking wage penalty.

In a second step of the econometric analysis, we use the fact that we observe the pattern

[2] Estimation and testing was used the *xtivreg2*-Stata-ado-file by Schaffer (2007).

of smoking behavior over a long period of time to distinguish between permanent smokers (*always-smokers*), permanent non-smokers (*never-smokers*) and individuals starting or stopping to smoke (*starters* and *stoppers*). More specifically, we open a rolling time-frame of five years $\{t-2, t-1, t, t+1, t+2\}$ in a year t and use smoking behavior observed during this period to form the groups mentioned above. An always-smoker is defined as an individual that is observed smoking during the complete interval. Similarly, a never-smoker is an individual that did not smoke in any year from $t-2$ to $t+2$. Starters are individuals who did not smoke from $t-2$ to t, but smoked in $t+1$ and $t+2$, while the group of stoppers is formed by those who smoked from $t-2$ to t and did not smoke in $t+1$ and $t+2$. Starting in 1993 and increasing t in one year steps until 2003, we obtain 11 cohorts used in the subsequent analysis. Pooling the data from these cohorts as case numbers become rather low due to the necessity of a balanced five year panel, we obtain a total of 2,782 never-smokers (1,684 men), 955 always-smokers (555 men), 89 starters (66 men) and 182 stoppers (121 men).

To obtain an estimate for the effect of starting or stopping to smoke, we match each member of the treatment group (either starters or stoppers) with a member of the control group (either always-smokers or never-smokers) using Mahanalobis-matching on the estimated propensity score to start/stop smoking and the respective cohort.[3] Matching is done on the whole sample, where gender is also included in the calculation of the Mahanalobis-distance and separately for men and women.

The propensity score is estimated using a Probit-regression with characteristics in t as right hand side variables and being a either a starter or stopper relative to being either a never-smoker or an always smoker as the dependent variable. Explanatory variables are the monthly wage in t, a third-order polynomial in age, the number of children and dummy-variables for marital status, education, the number of employees at the workplace, union-membership, employer-type (private company, local or central government), region of residence, socio-economic class of the current job (including some control for industry) and dummies for being of Indian, Pakistani or Bangladeshi heritage and for being non-white. Note that the wage in t can be expected to pick up most of the unobservable productivity differences that existed between the different groups in t. Additionally, matching on the

[3]Matching was performed using the *psmatch2*-Stata-ado-file (Version 3.0.0) by Leuven and Sianesi (2003).

cohort ensures that persons from the same cohort are matched to each other.

To obtain the wage impact of the decision to start or stop smoking, we then compare wages at $t+2$ within the matched pairs of individuals from the respective treatment/control group combination. The general setup of this estimation procedure is displayed in table 1. Note that this procedure is borrowed from the literature on the causal effect of exporting on productivity (see Wagner 2002 for the pioneering paper and Wagner 2007 for a survey on the literature).

(Table 1 about here.)

4 Descriptive results

Before turning to the econometric results, consider shortly the descriptive comparisons between smokers and non-smokers displayed in table 2. Note first that both male and female smokers earn between 100£ and 170£ (in 1987 prices) less than their non-smoking counterparts. Smokers also tend to work slightly longer hours, are younger and less likely to be married than non-smokers.

(Table 2 about here.)

Large differences can be seen when looking at education: Both male and female non-smokers are much more likely to have received an academic qualification, while a higher share of smokers is low qualified or did not obtain further qualifications. Note that these differences may point toward the importance of differences in time preferences as discussed in the introduction.

Other differences can be found when considering self-assessed health-status. Smokers are less likely then non-smokers to report excellent health and are more likely to be of fair health. Again, differences in health are one of the explanations typically used for the smoking wage penalty.

Finally, consider differences in employer characteristics: Here we find no large differences between smokers and non-smokers when it comes to firm size. However, smokers are more likely to be found working in private companies and less likely to be employed by the government.

5 Results

5.1 Regression results

Consider now the estimation results for the parameters of interest displayed in table 3. Full estimation results can be found in the tables 7 to 10 in the appendix. Focus first on the results using a dummy variable for smoker-status. Here we obtain a 2% to 3% earnings penalty in all cross-section regressions. This penalty becomes smaller and even positive for women when using fixed effects estimators. Using instrumental variables, the results are similar to the fixed effects estimates for men and about half the size of the OLS-estimates for women. However, neither the fixed effects estimates, nor the instrumental variables results are significant on any conventional level.

(Table 3 about here.)

Now consider the results for the smoking intensity. Here, we obtain a U-shaped relationship between tobacco consumption and wages for all OLS-estimations and, in case of men, also for the fixed effect estimates. Note that there are plenty observations on both sides of the minimum of the resulting parabola, indicating that the relationship should indeed be interpreted as U-shaped rather than degressively falling. Note further, that while the point estimates look minuscule at first sight, they give the effect of smoking one additional cigarette per day. Looking at the average consumption observed in our sample, which is 15.88 cigarettes per day for man and 13.76 cigarettes for women, we find wage penalties between 2% and 4% using the OLS estimates. For the (significant) fixed effects estimates for men, however, the average consumption leads to a wage penalty of only 0.2% which is clearly ignorable from an economic point of view. Both the fixed effects estimates for women as well as all instrumental variable estimates are insignificant.

Note that there are generally relatively small differences between the fixed effects and instrumental variable estimates which suggests that it is more important to control for time-constant unobserved heterogeneity than for contemporaneous endogeneity. There are, however, some hints that contemporaneous endogeneity matters for women as there are sign changes in the point estimates when using instrumental variables. Note though,

that these may be statistical artifacts as none of the estimates is statistically significant on any conventional level.

What do the results suggest for the different theories on the causes of the smoking wage penalty? First, note that the parameter estimates for the effect of smoking on wages do not change much when including controls for health status. This result suggests that health differences between smokers and non-smokers are – at least in the sample at hand – not responsible for the smoking wage penalty. There are two possible explanations for this result that is similar to the findings by Levine, Gustafson and Velenchick (1997). The first, that has also been used by Levine, Gustafson and Velenchick (1997), would be that health is more important for the question whether an individual is able to find employment than for the determination of wages conditional on being employed. A second possible explanation would be that many of the more severe adverse health effects of smoking show up later in life and do not matter (yet) for the age groups (20 to 55 years) considered in this investigation.

Now, consider the fixed effect and instrumental variable estimates for the wage effects of smoking. As health effects do not seem to play an important role and as unobserved factors have been purged from the estimation, the remaining effects can be related to either discrimination or productivity effects not related to health, e.g. a higher number of (smoking) breaks. As all estimates are either insignificant or economically negligible, it seems safe to conclude that neither discrimination, nor productivity differences between smokers and non-smokers play a dominant role in explaining the smoking wage penalty. One should note at this point though that the point estimates suggest a 1% wage penalty for smoking men related to these explanation which is about one third of the penalty found in cross-section regressions.

Finally, looking at the OLS-estimates, we find them to be about two to eight times larger than the fixed effect and instrumental variable estimates, a finding that points toward the importance of unobserved factors in the determination of the smoking wage penalty. This finding is also similar to the results found by Heineck and Schwarze (2003) for Germany.

5.2 Matching results

Consider now the matching estimates displayed in table 4. Remember that these are the wage effects in $t + 2$ associated with stopping or starting smoking in t relative to remaining smoker or non-smoker. The fact that the number of matched units in the separate estimations do not add up to the number of matched units in the estimation with the whole sample is caused by imposing a common support restriction and is harmless for the results. Starting with results for starters displayed in the top two panels of table 4, one notices that all effects are rather small and consequently insignificant on all conventional levels. Note that given this insignificance and the small samples for the separate estimations by gender, the sign change between the different estimates is not unusual.

(Table 4 about here.)

Considering the somewhat larger group of stoppers, we find only minimal effects associated with the decision to stop smoking. Again, all estimates are also insignificant on any conventional level. These findings, displaying a consistent lack of support for the existence of any causal effect of smoking on wages, provide further support for our earlier finding that the observed smoking wage penalty in the cross section is mainly caused by differences in unobservable factors.

6 Conclusion

This paper used annual panel data on tobacco consumption and wages from the British Household Panel Survey to investigate the effect of smoking on wages in the UK. Using linear regression, fixed effects panel estimators and panel instrumental variables, several hypotheses typically used to explain the smoking wage penalty were tested. More specifically, the importance of differences in health, differences in unobservable factors as well as discrimination and productivity differences unrelated to health was tested. Additionally, we used Mahalanobis-matching to compare individuals starting or stopping to smoke with individuals who remained either smokers or non-smokers throughout the observation period.

Our results show strong support for the importance of unobservable factors, including time preference rates and other preferences, for the determination of the smoking wage penalty. Discrimination, differences in health and differences in productivity, however, seem to be of relatively minor importance. Similarly there are no large returns or penalties associated with the decision to begin or stop smoking relative to remaining smoker or non-smoker. On a methodological level our results suggest that it is more important to correct for unobserved heterogeneity than for contemporaneous endogeneity when evaluating the effects of tobacco consumption.

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8 Tables

Table 1: Definition of groups

$t-2$	$t-1$	t	$t+1$	$t+2$	Group
smoker	smoker	smoker	smoker	smoker	always-smoker
non-smoker	non-smoker	non-smoker	non-smoker	non-smoker	never-smoker
non-smoker	non-smoker	non-smoker	smoker	smoker	starter
smoker	smoker	smoker	non-smoker	non-smoker	stopper
		matching takes place		comparison of incomes between matched groups	

Table 2: Smokers vs. non-smokers, t-tests

Variable	Men			Women		
	Means		P-value	Means		P-value
	non-smokers	smokers	means different	non-smokers	smokers	means different
Real monthly labor income (1987 prices)	1078.24	909.63	0.0000	809.28	707.91	0.0000
Log real monthly labor income	6.89	6.73	0.0000	6.60	6.47	0.0000
Typical weekly working hours	39.44	40.26	0.0000	36.98	37.28	0.0000
Number of cigarettes typically smoked per day	0.00	15.88	0.0000	0.00	13.76	0.0000
Age (years)	37.45	35.34	0.0000	36.30	35.64	0.0000
Non-white (1 = yes)	0.01	0.01	0.0030	0.02	0.02	0.4129
Indian, Pakistani, Bangladeshi (1 = yes)	0.01	0.01	0.6776	0.01	0.00	0.0000
Married (1 = yes)	0.64	0.48	0.0000	0.53	0.39	0.0000
Lives with partner (1 = yes)	0.13	0.23	0.0000	0.16	0.24	0.0000
Widowed (1 = yes)	0.00	0.00	0.0132	0.01	0.01	0.0020
Divorced (1 = yes)	0.03	0.04	0.0002	0.06	0.10	0.0000
Separated (1 = yes)	0.01	0.02	0.0000	0.02	0.03	0.2616
Single (1 = yes)	0.19	0.22	0.0000	0.21	0.23	0.0006
Number of children in household	0.75	0.69	0.0000	0.42	0.46	0.0002
University degree (1 = yes)	0.21	0.09	0.0000	0.24	0.11	0.0000
Higher qualification, teacher qual., nursing qual. (1 = yes)	0.33	0.28	0.0000	0.30	0.28	0.0139
A-levels (1 = yes)	0.14	0.15	0.4062	0.13	0.14	0.0558
O-levels (1 = yes)	0.17	0.22	0.0000	0.21	0.25	0.0000
Commercial qualification, apprencticeship,etc. (1 = yes)	0.06	0.09	0.0000	0.06	0.07	0.0001
No qualification (1 = yes)	0.09	0.16	0.0000	0.06	0.14	0.0000
Excellent health (1 = yes)	0.34	0.23	0.0000	0.30	0.21	0.0000
Good health (1 = yes)	0.49	0.53	0.0000	0.50	0.54	0.0000
Fair health (1 = yes)	0.14	0.19	0.0000	0.15	0.19	0.0000
Poor health (1 = yes)	0.03	0.04	0.0000	0.04	0.06	0.0000
Union member (1 = yes)	0.30	0.25	0.0000	0.36	0.28	0.0000
Workplace has 1 - 2 employees (1 = yes)	0.02	0.03	0.0030	0.02	0.02	0.4806
Workplace has 3 - 9 employees (1 = yes)	0.11	0.14	0.0000	0.12	0.13	0.0012
Workplace has 10 - 24 employees (1 = yes)	0.13	0.15	0.0000	0.16	0.16	0.8841
Workplace has 25 - 49 employees (1 = yes)	0.12	0.14	0.0000	0.15	0.13	0.0002
Workplace has 50 - 99 employees (1 = yes)	0.13	0.12	0.0133	0.13	0.13	0.4144
Workplace has 100 - 199 employees (1 = yes)	0.12	0.12	0.3953	0.11	0.11	0.6001
Workplace has 200 - 499 employees (1 = yes)	0.16	0.13	0.0000	0.12	0.14	0.0000
Workplace has 500 - 999 employees (1 = yes)	0.09	0.07	0.0000	0.07	0.07	0.8047
Workplace has 1000 or more employees (1 = yes)	0.12	0.09	0.0000	0.13	0.11	0.0051
Employer is private firm/company (1 = yes)	0.75	0.82	0.0000	0.53	0.67	0.0000
Employer is civil service/central government (1 = yes)	0.06	0.04	0.0000	0.06	0.04	0.0000
Employer is local government/town hall (1 = yes)	0.10	0.07	0.0000	0.21	0.14	0.0000
Other employer (1 = yes)	0.09	0.07	0.0000	0.20	0.15	0.0000
No. of Observations		33,313			23,546	
No. of Individuals		6,647			5,611	

Table 3: Impact of smoking on wages, dependent variable: log monthly real wages

Variable	OLS	Fixed-Effects	Panel-IV	OLS	Fixed-Effects	Panel-IV
Male sample, no health controls						
Individual smokes (1 = yes)	-0.0307***	-0.0091	0.0024	–	–	–
	(0.0077)	(0.0074)	(0.0161)	–	–	–
Number of cigarettes typically smoked per day	–	–	–	-0.0033***	-0.0017+	-0.0003
	–	–	–	(0.0009)	(0.0009)	(0.0025)
Number of cigarettes typically smoked per day	–	–	–	0.0001*	0.0001**	0.0001
(squared)	–	–	–	(0.0000)	(0.0000)	(0.0001)
No. of Obs.	32,356	32,356	17,216	32,243	32,243	17,069
Male sample, health controls						
Individual smokes (1 = yes)	-0.0265***	-0.0093	0.0024	–	–	–
	(0.0077)	(0.0074)	(0.0161)	–	–	–
Number of cigarettes typically smoked per day	–	–	–	-0.0031***	-0.0017+	-0.0004
	–	–	–	(0.0009)	(0.0009)	(0.0025)
Number of cigarettes typically smoked per day	–	–	–	0.0001*	0.0001**	0.0001
(squared)	–	–	–	(0.0000)	(0.0000)	(0.0001)
No. of Obs.	32,356	32,356	17,216	32,2430	32,2430	17,069
Female sample, no health controls						
Individual smokes (1 = yes)	-0.0247**	0.0030	-0.0165	–	–	–
	(0.0084)	(0.0083)	(0.0229)	–	–	–
Number of cigarettes typically smoked per day	–	–	–	-0.0037**	0.0006	-0.0017
	–	–	–	(0.0013)	(0.0012)	(0.0034)
Number of cigarettes typically smoked per day	–	–	–	0.0001*	0.0000	-0.0000
(squared)	–	–	–	(0.0001)	(0.0000)	(0.0001)
No. of Obs.	22,733	22,733	10,673	22,640	22,640	10,562
Female sample, health controls						
Individual smokes (1 = yes)	-0.0230**	0.0031	-0.0173	–	–	–
	(0.0084)	(0.0083)	(0.0230)	–	–	–
Number of cigarettes typically smoked per day	–	–	–	-0.0036**	0.0006	-0.0018
	–	–	–	(0.0013)	(0.0012)	(0.0034)
Number of cigarettes typically smoked per day	–	–	–	0.0001+	0.0000	-0.0000
(squared)	–	–	–	(0.0001)	(0.0000)	(0.0001)
No. of Obs.	22,733	22,733	10,673	22,640	22,640	10,562

Coefficients, cluster-robust standard errors in parentheses. ***/**/*/+ denote significance on the 0.1%, 1%, 5% and 10% level respectively. All estimations include a third-order polynomial in age, the number of children and dummy-variables for marital status, education, the number of employees at the workplace, union-membership, employer-type (private company, local or central government), region of residence, socio-economic class of the current job (including some control for industry) and year of observation. The OLS-estimations also include dummies for being of Indian, Pakistani or Bangladeshi heritage and for being non-white. Full estimation results can be found in the tables 7 to 10 in the appendix.

Table 4: Impact of smoking on wages t+2, average treatment effects on the treated (ATT), Mahanalobis-matching

Starters vs. never-smokers			
	Whole sample	Men	Women
ATT	-63.94	43.64	43.56
	(71.16)	(73.90)	(118.67)
No. of matched starters	89	66	18
Starters vs. always-smokers			
	Whole sample	Men	Women
ATT	-18.71	-78.68	-73.97
	(81.26)	(100.39)	(142.30)
No. of matched starters	85	64	16
Stoppers vs. never-smokers			
	Whole sample	Men	Women
ATT	-1.14	-10.86	-10.42
	(49.75)	(66.52)	(67.51)
No. of matched stoppers	181	119	61
Starters vs. always-smokers			
	Whole sample	Men	Women
ATT	-68.99	84.57	16.50
	(65.84)	(75.91)	(88.62)
No. of matched stoppers	180	114	60

Average treatment effect on the treated, standard errors in parentheses. ***/**/*/+ denote significance on the 0.1%, 1%, 5% and 10% level respectively. Matching variables to estimate the propensity score, all taken from year t, were monthly wage, a third-order polynomial in age, the number of children and dummy-variables for marital status, education, the number of employees at the workplace, union-membership, employer-type (private company, local or central government), region of residence, socio-economic class of the current job (including some control for industry) Indian, Pakistani or Bangladeshi heritage and for being non-white. Mahanalobis matching was performed on the propensity score, the respective cohort and for the estimations on the whole sample on gender. Case numbers reported are those on common support only.

9 Appendix

Table 5: Descriptive statistics, male estimation sample

Variable	Mean	Std.dev.		Min.	Max.
		overall	within		
Real monthly labor income (1987 prices)	1028.64	476.3781	212.6472	337.41	3227.32
Log real monthly labor income	6.84	0.4300	0.1922	5.82	8.08
Typical weekly working hours	39.68	4.7782	2.9414	30.00	60.00
Individual smokes (1 = yes)	0.29	0.4552	0.1859	0.00	1.00
Number of cigarettes typically smoked per day	4.62	8.5657	3.2519	0.00	70.00
Age (years)	36.80	9.5930	2.9310	20.00	55.00
Non-white (1 = yes)	0.01	0.1007	0.0000	0.00	1.00
Indian, Pakistani, Bangladeshi (1 = yes)	0.01	0.1067	0.0000	0.00	1.00
Married (1 = yes)	0.59	0.4918	0.2113	0.00	1.00
Lives with partner (1 = yes)	0.16	0.3643	0.2124	0.00	1.00
Widowed (1 = yes)	0.00	0.0513	0.0302	0.00	1.00
Divorced (1 = yes)	0.03	0.1809	0.1022	0.00	1.00
Separated (1 = yes)	0.01	0.1162	0.0886	0.00	1.00
Single (1 = yes)	0.20	0.4015	0.1676	0.00	1.00
Number of children in household	0.73	1.0086	0.4888	0.00	6.00
University degree (1 = yes)	0.18	0.3843	0.0642	0.00	1.00
Higher qualification, teacher qual., nursing qual. (1 = yes)	0.31	0.4643	0.1790	0.00	1.00
A-levels (1 = yes)	0.15	0.3528	0.1247	0.00	1.00
O-levels (1 = yes)	0.19	0.3888	0.1192	0.00	1.00
Commercial qualification, apprencticeship,etc. (1 = yes)	0.07	0.2509	0.0695	0.00	1.00
No qualification (1 = yes)	0.11	0.3087	0.0691	0.00	1.00
Excellent health (1 = yes)	0.31	0.4606	0.3217	0.00	1.00
Good health (1 = yes)	0.51	0.4999	0.3929	0.00	1.00
Fair health (1 = yes)	0.15	0.3582	0.2795	0.00	1.00
Poor health (1 = yes)	0.03	0.1831	0.1436	0.00	1.00
Union member (1 = yes)	0.29	0.4532	0.2572	0.00	1.00
Workplace has 1 - 2 employees (1 = yes)	0.02	0.1543	0.1079	0.00	1.00
Workplace has 3 - 9 employees (1 = yes)	0.12	0.3253	0.2255	0.00	1.00
Workplace has 10 - 24 employees (1 = yes)	0.14	0.3428	0.2394	0.00	1.00
Workplace has 25 - 49 employees (1 = yes)	0.13	0.3341	0.2476	0.00	1.00
Workplace has 50 - 99 employees (1 = yes)	0.13	0.3337	0.2441	0.00	1.00
Workplace has 100 - 199 employees (1 = yes)	0.12	0.3234	0.2411	0.00	1.00
Workplace has 200 - 499 employees (1 = yes)	0.15	0.3586	0.2532	0.00	1.00
Workplace has 500 - 999 employees (1 = yes)	0.08	0.2745	0.1985	0.00	1.00
Workplace has 1000 or more employees (1 = yes)	0.11	0.3145	0.1935	0.00	1.00
Employer is private firm/company (1 = yes)	0.77	0.4199	0.1569	0.00	1.00
Employer is civil service/central government (1 = yes)	0.05	0.2233	0.1098	0.00	1.00
Employer is local government/town hall (1 = yes)	0.09	0.2911	0.1214	0.00	1.00
Other employer (1 = yes)	0.08	0.2751	0.1465	0.00	1.00
No. of Observations	33,313				
No. of Individuals	6,647				

Table 6: Descriptive statistics, female estimation sample

Variable	Mean	Std.dev.		Min.	Max.
		overall	within		
Real monthly labor income (1987 prices)	779.20	349.7612	138.9596	246.69	2141.89
Log real monthly labor income	6.57	0.4261	0.1712	5.51	7.67
Typical weekly working hours	37.07	3.8251	2.3508	30.00	60.00
Individual smokes (1 = yes)	0.30	0.4566	0.1709	0.00	1.00
Number of cigarettes typically smoked per day	4.04	7.4384	2.5884	0.00	60.00
Age (years)	36.11	9.9942	2.6547	20.00	55.00
Non-white (1 = yes)	0.02	0.1365	0.0000	0.00	1.00
Indian, Pakistani, Bangladeshi (1 = yes)	0.01	0.0947	0.0000	0.00	1.00
Married (1 = yes)	0.49	0.4999	0.2168	0.00	1.00
Lives with partner (1 = yes)	0.18	0.3877	0.2236	0.00	1.00
Widowed (1 = yes)	0.01	0.1067	0.0517	0.00	1.00
Divorced (1 = yes)	0.07	0.2585	0.1262	0.00	1.00
Separated (1 = yes)	0.02	0.1560	0.1055	0.00	1.00
Single (1 = yes)	0.22	0.4137	0.1728	0.00	1.00
Number of children in household	0.43	0.7784	0.3530	0.00	6.00
University degree (1 = yes)	0.20	0.4014	0.0751	0.00	1.00
Higher qualification, teacher qual., nursing qual. (1 = yes)	0.30	0.4562	0.1694	0.00	1.00
A-levels (1 = yes)	0.14	0.3441	0.1162	0.00	1.00
O-levels (1 = yes)	0.22	0.4136	0.1224	0.00	1.00
Commercial qualification, apprencticeship,etc. (1 = yes)	0.06	0.2442	0.0621	0.00	1.00
No qualification (1 = yes)	0.08	0.2756	0.0646	0.00	1.00
Excellent health (1 = yes)	0.28	0.4470	0.3108	0.00	1.00
Good health (1 = yes)	0.52	0.4998	0.3872	0.00	1.00
Fair health (1 = yes)	0.16	0.3658	0.2831	0.00	1.00
Poor health (1 = yes)	0.05	0.2155	0.1686	0.00	1.00
Union member (1 = yes)	0.34	0.4731	0.2547	0.00	1.00
Workplace has 1 - 2 employees (1 = yes)	0.02	0.1359	0.0888	0.00	1.00
Workplace has 3 - 9 employees (1 = yes)	0.12	0.3278	0.2136	0.00	1.00
Workplace has 10 - 24 employees (1 = yes)	0.16	0.3704	0.2422	0.00	1.00
Workplace has 25 - 49 employees (1 = yes)	0.15	0.3533	0.2410	0.00	1.00
Workplace has 50 - 99 employees (1 = yes)	0.13	0.3332	0.2311	0.00	1.00
Workplace has 100 - 199 employees (1 = yes)	0.11	0.3132	0.2232	0.00	1.00
Workplace has 200 - 499 employees (1 = yes)	0.12	0.3259	0.2294	0.00	1.00
Workplace has 500 - 999 employees (1 = yes)	0.07	0.2490	0.1790	0.00	1.00
Workplace has 1000 or more employees (1 = yes)	0.12	0.3294	0.1926	0.00	1.00
Employer is private firm/company (1 = yes)	0.57	0.4948	0.1792	0.00	1.00
Employer is civil service/central government (1 = yes)	0.06	0.2306	0.1026	0.00	1.00
Employer is local government/town hall (1 = yes)	0.19	0.3903	0.1515	0.00	1.00
Other employer (1 = yes)	0.18	0.3879	0.1754	0.00	1.00
No. of Observations	23,546				
No. of Individuals	5,611				

Table 7: Wage regressions, male sample, without health controls, dependent variable: log monthly real wages

Variable	OLS	Fixed-Effects	Panel-IV	OLS	Fixed-Effects	Panel-IV
Individual smokes (1 = yes)	-0.0307***	-0.0091	0.0024	–	–	–
	(0.0077)	(0.0074)	(0.0161)	–	–	–
Number of cigarettes typically smoked per day	–	–	–	-0.0033***	-0.0017+	-0.0003
	–	–	–	(0.0009)	(0.0009)	(0.0025)
Number of cigarettes typically smoked per day (squared)	–	–	–	0.0001*	0.0001**	0.0001
	–	–	–	(0.0000)	(0.0000)	(0.0001)
Age (years)	0.1097***	0.1938***	0.1397***	0.1095***	0.1943***	0.1405***
	(0.0140)	(0.0144)	(0.0268)	(0.0141)	(0.0144)	(0.0272)
Age (squared)	-0.0022***	-0.0037***	-0.0032***	-0.0022***	-0.0037***	-0.0032***
	(0.0004)	(0.0004)	(0.0007)	(0.0004)	(0.0004)	(0.0007)
Age (cubic)	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Married (1 = yes)	0.1258***	0.0305*	0.0055	0.1258***	0.0298*	0.0044
	(0.0117)	(0.0130)	(0.0125)	(0.0117)	(0.0130)	(0.0126)
Lives with partner (1 = yes)	0.0723***	0.0186+	-0.0062	0.0730***	0.0175+	-0.0071
	(0.0105)	(0.0104)	(0.0096)	(0.0105)	(0.0105)	(0.0097)
Widowed (1 = yes)	0.0642	0.0052	-0.0073	0.0653	0.0034	-0.0102
	(0.0530)	(0.0755)	(0.0530)	(0.0530)	(0.0752)	(0.0530)
Divorced (1 = yes)	0.0508*	-0.0019	0.0014	0.0507*	-0.0049	-0.0025
	(0.0217)	(0.0194)	(0.0181)	(0.0218)	(0.0194)	(0.0181)
Separated (1 = yes)	0.1052***	0.0127	-0.0093	0.1055***	0.0099	-0.0129
	(0.0239)	(0.0193)	(0.0171)	(0.0237)	(0.0193)	(0.0173)
Number of children in household	0.0133**	0.0075+	0.0102*	0.0135**	0.0074+	0.0101*
	(0.0042)	(0.0041)	(0.0043)	(0.0042)	(0.0041)	(0.0043)
Indian, Pakistani, Bangladeshi (1 = yes)	-0.1585***	–	–	-0.1607***	–	–
	(0.0397)	–	–	(0.0397)	–	–
Non-white (1 = yes)	-0.0826*	–	–	-0.0821*	–	–
	(0.0344)	–	–	(0.0342)	–	–
University degree (1 = yes)	0.1993***	0.0763*	0.0418	0.1980***	0.0758*	0.0417
	(0.0141)	(0.0313)	(0.0346)	(0.0141)	(0.0313)	(0.0348)
Higher qualification, teacher qual., nursing qual. (1 = yes)	0.0681***	-0.0452**	0.0062	0.0674***	-0.0458**	0.0057
	(0.0108)	(0.0148)	(0.0173)	(0.0108)	(0.0147)	(0.0172)
A-levels (1 = yes)	0.0252*	-0.0370+	-0.0333	0.0252*	-0.0372*	-0.0346
	(0.0128)	(0.0189)	(0.0232)	(0.0128)	(0.0188)	(0.0232)
Commercial qualification, apprenticeship,etc. (1 = yes)	-0.0183	-0.0467	-0.0466	-0.0178	-0.0476+	-0.0485
	(0.0168)	(0.0290)	(0.0321)	(0.0167)	(0.0289)	(0.0324)
No qualification (1 = yes)	-0.1271***	-0.0309	-0.0336	-0.1262***	-0.0312	-0.0345
	(0.0139)	(0.0258)	(0.0358)	(0.0139)	(0.0257)	(0.0354)
Union member (1 = yes)	0.0656***	0.0164**	0.0159*	0.0657***	0.0170**	0.0170**
	(0.0078)	(0.0059)	(0.0063)	(0.0078)	(0.0059)	(0.0063)
Employer is civil service/central government (1 = yes)	-0.0501**	-0.0214	0.0075	-0.0504**	-0.0221	0.0072
	(0.0167)	(0.0170)	(0.0149)	(0.0167)	(0.0170)	(0.0150)
Employer is local government/town hall (1 = yes)	-0.0201+	0.0013	0.0091	-0.0203+	0.0017	0.0095
	(0.0122)	(0.0182)	(0.0158)	(0.0123)	(0.0183)	(0.0160)
Other employer (1 = yes)	-0.0890***	-0.0156	0.0083	-0.0889***	-0.0146	0.0084
	(0.0136)	(0.0125)	(0.0109)	(0.0136)	(0.0125)	(0.0111)
Workplace has 1 - 2 employees (1 = yes)	-0.1565***	-0.0768***	0.0030	-0.1563***	-0.0781***	0.0031
	(0.0227)	(0.0163)	(0.0139)	(0.0228)	(0.0162)	(0.0139)
Workplace has 3 - 9 employees (1 = yes)	-0.1049***	-0.0527***	-0.0136+	-0.1049***	-0.0532***	-0.0133+
	(0.0109)	(0.0083)	(0.0075)	(0.0109)	(0.0083)	(0.0076)
Workplace has 10 - 24 employees (1 = yes)	-0.0389***	-0.0227**	0.0016	-0.0393***	-0.0225**	0.0014
	(0.0109)	(0.0080)	(0.0068)	(0.0109)	(0.0080)	(0.0069)
Workplace has 25 - 49 employees (1 = yes)	-0.0225*	-0.0205**	-0.0069	-0.0229*	-0.0207**	-0.0076
	(0.0100)	(0.0066)	(0.0059)	(0.0100)	(0.0066)	(0.0059)
Workplace has 100 - 199 employees (1 = yes)	0.0153	0.0074	0.0099+	0.0151	0.0067	0.0096+
	(0.0098)	(0.0066)	(0.0057)	(0.0098)	(0.0066)	(0.0057)
Workplace has 200 - 499 employees (1 = yes)	0.0307**	0.0073	-0.0027	0.0306**	0.0070	-0.0022
	(0.0107)	(0.0075)	(0.0064)	(0.0107)	(0.0075)	(0.0064)
Workplace has 500 - 999 employees (1 = yes)	0.0630***	0.0147	0.0015	0.0626***	0.0139	0.0017
	(0.0129)	(0.0094)	(0.0076)	(0.0129)	(0.0095)	(0.0077)
Workplace has 1000 or more employees (1 = yes)	0.0775***	0.0217*	0.0018	0.0772***	0.0212*	0.0022
	(0.0125)	(0.0093)	(0.0080)	(0.0125)	(0.0093)	(0.0080)
Constant	4.6483***	3.4559***	0.0303***	4.8147***	3.4455***	0.0303***
	(0.1735)	(0.1832)	(0.0051)	(0.1943)	(0.1835)	(0.0051)
Occupation class dummies	(included)	(included)	(included)	(included)	(included)	(included)
Regional dummies	(included)	(included)	(included)	(included)	(included)	(included)
No. of Obs.	32,356	32,356	17,216	32,243	32,243	17,069
R^2	0.4615	0.2605	0.0231	0.4621	0.2617	0.0236
Sig.(Model)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Coefficients, cluster-robust standard errors in parentheses. ***/**/*/+ denote significance on the 0.1%, 1%, 5% and 10% level respectively.

Table 8: Wage regressions, female sample, without health controls, dependent variable: log monthly real wages

Variable	OLS	Fixed-Effects	Panel-IV	OLS	Fixed-Effects	Panel-IV
Individual smokes (1 = yes)	-0.0247**	0.0030	-0.0165	–	–	–
	(0.0084)	(0.0083)	(0.0229)	–	–	–
Number of cigarettes typically smoked per day	–	–	–	-0.0037**	0.0006	-0.0017
	–	–	–	(0.0013)	(0.0012)	(0.0034)
Number of cigarettes typically smoked per day (squared)	–	–	–	0.0001*	0.0000	-0.0000
	–	–	–	(0.0001)	(0.0000)	(0.0001)
Age (years)	0.1807***	0.2137***	0.0849**	0.1807***	0.2141***	0.0885***
	(0.0150)	(0.0154)	(0.0268)	(0.0150)	(0.0155)	(0.0268)
Age (squared)	-0.0042***	-0.0043***	-0.0018*	-0.0042***	-0.0043***	-0.0019**
	(0.0004)	(0.0004)	(0.0007)	(0.0004)	(0.0004)	(0.0007)
Age (cubic)	0.0000***	0.0000***	0.0000	0.0000***	0.0000***	0.0000+
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Married (1 = yes)	-0.0080	0.0019	-0.0040	-0.0079	0.0018	-0.0056
	(0.0114)	(0.0120)	(0.0112)	(0.0114)	(0.0121)	(0.0113)
Lives with partner (1 = yes)	0.0175+	0.0067	0.0038	0.0179+	0.0068	0.0039
	(0.0104)	(0.0099)	(0.0094)	(0.0104)	(0.0100)	(0.0094)
Widowed (1 = yes)	-0.0432	0.0163	0.0133	-0.0409	0.0160	0.0116
	(0.0344)	(0.0302)	(0.0254)	(0.0345)	(0.0304)	(0.0257)
Divorced (1 = yes)	-0.0002	-0.0070	0.0193	-0.0001	-0.0077	0.0145
	(0.0174)	(0.0178)	(0.0165)	(0.0174)	(0.0178)	(0.0164)
Separated (1 = yes)	-0.0103	-0.0005	0.0111	-0.0110	-0.0037	0.0010
	(0.0216)	(0.0167)	(0.0158)	(0.0216)	(0.0163)	(0.0146)
Number of children in household	-0.0324***	-0.0465***	-0.0123+	-0.0322***	-0.0461***	-0.0128+
	(0.0054)	(0.0060)	(0.0071)	(0.0054)	(0.0060)	(0.0071)
Indian, Pakistani, Bangladeshi (1 = yes)	-0.1168*	–	–	-0.1179*	–	–
	(0.0481)	–	–	(0.0481)	–	–
Non-white (1 = yes)	-0.0523+	–	–	-0.0527+	–	–
	(0.0285)	–	–	(0.0287)	–	–
University degree (1 = yes)	0.2362***	0.0744*	0.0542*	0.2360***	0.0734*	0.0528+
	(0.0150)	(0.0294)	(0.0275)	(0.0151)	(0.0294)	(0.0274)
Higher qualification, teacher qual., nursing qual. (1 = yes)	0.0898***	0.0271+	0.0094	0.0898***	0.0260+	0.0078
	(0.0117)	(0.0150)	(0.0175)	(0.0117)	(0.0151)	(0.0175)
A-levels (1 = yes)	0.0365**	-0.0160	-0.0119	0.0363**	-0.0171	-0.0152
	(0.0129)	(0.0184)	(0.0180)	(0.0129)	(0.0185)	(0.0180)
Commercial qualification, apprenticeship,etc. (1 = yes)	-0.0414*	0.0490	0.0017	-0.0405*	0.0482	0.0001
	(0.0165)	(0.0317)	(0.0331)	(0.0165)	(0.0317)	(0.0331)
No qualification (1 = yes)	-0.1140***	-0.0328	-0.0634+	-0.1144***	-0.0330	-0.0690*
	(0.0181)	(0.0266)	(0.0335)	(0.0181)	(0.0268)	(0.0342)
Union member (1 = yes)	0.0829***	0.0169**	0.0130*	0.0824***	0.0172**	0.0137*
	(0.0083)	(0.0060)	(0.0059)	(0.0083)	(0.0060)	(0.0058)
Employer is civil service/central government (1 = yes)	-0.0072	-0.0060	-0.0024	-0.0071	-0.0042	-0.0016
	(0.0154)	(0.0161)	(0.0144)	(0.0153)	(0.0161)	(0.0145)
Employer is local government/town hall (1 = yes)	0.0513***	0.0412*	-0.0049	0.0512***	0.0425*	-0.0044
	(0.0133)	(0.0169)	(0.0135)	(0.0134)	(0.0170)	(0.0136)
Other employer (1 = yes)	-0.0138	0.0030	-0.0042	-0.0135	0.0043	-0.0029
	(0.0113)	(0.0115)	(0.0089)	(0.0113)	(0.0115)	(0.0090)
Workplace has 1 - 2 employees (1 = yes)	-0.1773***	-0.1030***	-0.0276	-0.1792***	-0.1026***	-0.0355+
	(0.0289)	(0.0217)	(0.0220)	(0.0288)	(0.0217)	(0.0208)
Workplace has 3 - 9 employees (1 = yes)	-0.1234***	-0.0494***	-0.0210*	-0.1234***	-0.0484***	-0.0197*
	(0.0124)	(0.0096)	(0.0082)	(0.0124)	(0.0096)	(0.0083)
Workplace has 10 - 24 employees (1 = yes)	-0.0549***	-0.0283**	-0.0018	-0.0549***	-0.0277**	-0.0010
	(0.0121)	(0.0086)	(0.0079)	(0.0121)	(0.0086)	(0.0079)
Workplace has 25 - 49 employees (1 = yes)	-0.0476***	-0.0133+	0.0035	-0.0470***	-0.0130+	0.0040
	(0.0112)	(0.0071)	(0.0062)	(0.0113)	(0.0071)	(0.0062)
Workplace has 100 - 199 employees (1 = yes)	0.0083	0.0001	0.0048	0.0083	0.0001	0.0050
	(0.0118)	(0.0069)	(0.0064)	(0.0118)	(0.0069)	(0.0064)
Workplace has 200 - 499 employees (1 = yes)	0.0239*	0.0122	0.0093	0.0246*	0.0128	0.0102
	(0.0119)	(0.0082)	(0.0072)	(0.0120)	(0.0082)	(0.0073)
Workplace has 500 - 999 employees (1 = yes)	0.0284+	0.0257**	0.0119	0.0284+	0.0254*	0.0126
	(0.0149)	(0.0099)	(0.0086)	(0.0150)	(0.0100)	(0.0087)
Workplace has 1000 or more employees (1 = yes)	0.0275*	0.0210*	0.0123	0.0281*	0.0214*	0.0127
	(0.0134)	(0.0101)	(0.0082)	(0.0134)	(0.0101)	(0.0082)
Constant	4.0605***	3.0978***	0.0319***	4.0488***	3.1589***	0.0325***
	(0.2313)	(0.2157)	(0.0051)	(0.2309)	(0.2094)	(0.0051)
Occupation class dummies	(included)	(included)	(included)	(included)	(included)	(included)
Regional dummies	(included)	(included)	(included)	(included)	(included)	(included)
No. of Obs.	22,733	22,733	10,673	22,640	22,640	10,562
R^2	0.5283	0.3298	0.0295	0.5284	0.3301	0.0281
Sig.(Model)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Coefficients, cluster-robust standard errors in parentheses. ***/**/*/+ denote significance on the 0.1%, 1%, 5% and 10% level respectively.

Table 9: Wage regressions, male sample, with health controls, dependent variable: log monthly real wages

Variable	OLS	Fixed-Effects	Panel-IV	OLS	Fixed-Effects	Panel-IV
Individual smokes (1 = yes)	-0.0265***	-0.0093	0.0024	–	–	–
	(0.0077)	(0.0074)	(0.0161)	–	–	–
Number of cigarettes typically smoked per day	–	–	–	-0.0031***	-0.0017+	-0.0004
	–	–	–	(0.0009)	(0.0009)	(0.0025)
Number of cigarettes typically smoked per day (squared)	–	–	–	0.0001*	0.0001**	0.0001
	–	–	–	(0.0000)	(0.0000)	(0.0001)
Excellent health (1 = yes)	0.0253***	-0.0008	0.0056+	0.0250***	-0.0010	0.0054+
	(0.0062)	(0.0036)	(0.0032)	(0.0062)	(0.0036)	(0.0032)
Fair health (1 = yes)	-0.0288***	-0.0051	0.0027	-0.0288***	-0.0052	0.0025
	(0.0067)	(0.0042)	(0.0037)	(0.0067)	(0.0042)	(0.0037)
Poor health (1 = yes)	-0.0735***	-0.0244**	-0.0146+	-0.0730***	-0.0245**	-0.0150*
	(0.0124)	(0.0076)	(0.0076)	(0.0124)	(0.0076)	(0.0076)
Age (years)	0.1105***	0.1938***	0.1402***	0.1103***	0.1943***	0.1410***
	(0.0140)	(0.0144)	(0.0268)	(0.0140)	(0.0144)	(0.0272)
Age (squared)	-0.0022***	-0.0037***	-0.0032***	-0.0022***	-0.0037***	-0.0032***
	(0.0004)	(0.0004)	(0.0007)	(0.0004)	(0.0004)	(0.0007)
Age (cubic)	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Married (1 = yes)	0.1245***	0.0303*	0.0052	0.1246***	0.0297*	0.0042
	(0.0117)	(0.0130)	(0.0125)	(0.0117)	(0.0130)	(0.0126)
Lives with partner (1 = yes)	0.0722***	0.0185+	-0.0063	0.0729***	0.0174+	-0.0071
	(0.0105)	(0.0104)	(0.0096)	(0.0105)	(0.0105)	(0.0097)
Widowed (1 = yes)	0.0629	0.0057	-0.0070	0.0638	0.0039	-0.0099
	(0.0528)	(0.0755)	(0.0530)	(0.0527)	(0.0753)	(0.0530)
Divorced (1 = yes)	0.0516*	-0.0016	0.0019	0.0515*	-0.0046	-0.0021
	(0.0215)	(0.0194)	(0.0181)	(0.0216)	(0.0194)	(0.0181)
Separated (1 = yes)	0.1033***	0.0126	-0.0093	0.1033***	0.0099	-0.0129
	(0.0237)	(0.0193)	(0.0171)	(0.0236)	(0.0193)	(0.0173)
Number of children in household	0.0134**	0.0076+	0.0101*	0.0136**	0.0074+	0.0100*
	(0.0041)	(0.0041)	(0.0043)	(0.0041)	(0.0041)	(0.0043)
Indian, Pakistani, Bangladeshi (1 = yes)	-0.1558***	–	–	-0.1575***	–	–
	(0.0400)	–	–	(0.0400)	–	–
Non-white (1 = yes)	-0.0809*	–	–	-0.0803*	–	–
	(0.0348)	–	–	(0.0347)	–	–
educ==universitydegree	0.1966***	0.0758*	0.0416	0.1954***	0.0752*	0.0415
	(0.0141)	(0.0313)	(0.0346)	(0.0141)	(0.0313)	(0.0347)
Higher qualification, teacher qual., nursing qual. (1 = yes)	0.0677***	-0.0450**	0.0060	0.0670***	-0.0457**	0.0055
	(0.0107)	(0.0147)	(0.0173)	(0.0107)	(0.0147)	(0.0172)
A-levels (1 = yes)	0.0248+	-0.0370*	-0.0337	0.0248+	-0.0372*	-0.0350
	(0.0127)	(0.0189)	(0.0232)	(0.0127)	(0.0188)	(0.0232)
Commercial qualification, apprenticeship,etc. (1 = yes)	-0.0181	-0.0467	-0.0466	-0.0177	-0.0476+	-0.0484
	(0.0168)	(0.0289)	(0.0321)	(0.0168)	(0.0288)	(0.0325)
No qualification (1 = yes)	-0.1250***	-0.0306	-0.0330	-0.1242***	-0.0308	-0.0339
	(0.0138)	(0.0257)	(0.0357)	(0.0138)	(0.0256)	(0.0354)
Union member (1 = yes)	0.0658***	0.0166**	0.0158*	0.0659***	0.0171**	0.0169**
	(0.0078)	(0.0059)	(0.0063)	(0.0078)	(0.0059)	(0.0063)
Employer is civil service/central government (1 = yes)	-0.0487**	-0.0216	0.0073	-0.0489**	-0.0223	0.0070
	(0.0165)	(0.0170)	(0.0149)	(0.0165)	(0.0170)	(0.0150)
Employer is local government/town hall (1 = yes)	-0.0198	0.0012	0.0095	-0.0199	0.0015	0.0099
	(0.0122)	(0.0182)	(0.0158)	(0.0122)	(0.0183)	(0.0160)
Other employer (1 = yes)	-0.0882***	-0.0155	0.0080	-0.0881***	-0.0146	0.0081
	(0.0135)	(0.0125)	(0.0109)	(0.0135)	(0.0125)	(0.0111)
Workplace has 1 - 2 employees (1 = yes)	-0.1570***	-0.0767***	0.0032	-0.1569***	-0.0781***	0.0033
	(0.0228)	(0.0163)	(0.0139)	(0.0229)	(0.0162)	(0.0139)
Workplace has 3 - 9 employees (1 = yes)	-0.1045***	-0.0529***	-0.0138+	-0.1046***	-0.0534***	-0.0135+
	(0.0109)	(0.0083)	(0.0075)	(0.0109)	(0.0083)	(0.0076)
Workplace has 10 - 24 employees (1 = yes)	-0.0390***	-0.0227**	0.0015	-0.0394***	-0.0225**	0.0013
	(0.0108)	(0.0080)	(0.0068)	(0.0108)	(0.0080)	(0.0069)
Workplace has 25 - 49 employees (1 = yes)	-0.0219*	-0.0205**	-0.0070	-0.0223*	-0.0207**	-0.0076
	(0.0099)	(0.0066)	(0.0059)	(0.0100)	(0.0066)	(0.0059)
Workplace has 100 - 199 employees (1 = yes)	0.0149	0.0073	0.0099+	0.0147	0.0067	0.0097+
	(0.0098)	(0.0066)	(0.0057)	(0.0098)	(0.0066)	(0.0057)
Workplace has 200 - 499 employees (1 = yes)	0.0310**	0.0072	-0.0026	0.0309**	0.0069	-0.0020
	(0.0106)	(0.0075)	(0.0064)	(0.0106)	(0.0075)	(0.0064)
Workplace has 500 - 999 employees (1 = yes)	0.0624***	0.0144	0.0013	0.0620***	0.0135	0.0015
	(0.0128)	(0.0094)	(0.0076)	(0.0128)	(0.0095)	(0.0077)
Workplace has 1000 or more employees (1 = yes)	0.0769***	0.0218*	0.0022	0.0765***	0.0213*	0.0025
	(0.0125)	(0.0093)	(0.0080)	(0.0125)	(0.0093)	(0.0080)
Constant	4.6359***	3.4570***	0.0303***	4.7949***	3.4468***	0.0303***
	(0.1733)	(0.1830)	(0.0051)	(0.1939)	(0.1834)	(0.0051)
Occupation class dummies	(included)	(included)	(included)	(included)	(included)	(included)
Regional dummies	(included)	(included)	(included)	(included)	(included)	(included)
No. of Obs.	32,356	32,356	17,216	32,2430	32,2430	17,069
R^2	0.4642	0.2609	0.0236	0.4648	0.2621	0.0241
Sig.(Model)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Coefficients, cluster-robust standard errors in parentheses. ***/**/*/+ denote significance on the 0.1%, 1%, 5% and 10% level respectively.

Table 10: Wage regressions, male sample, with health controls, dependent variable: log monthly real wages

Variable	OLS	Fixed-Effects	Panel-IV	OLS	Fixed-Effects	Panel-IV
Individual smokes (1 = yes)	-0.0230**	0.0031	-0.0173	–	–	–
	(0.0084)	(0.0083)	(0.0230)	–	–	–
Number of cigarettes typically smoked per day	–	–	–	-0.0036**	0.0006	-0.0018
	–	–	–	(0.0013)	(0.0012)	(0.0034)
Number of cigarettes typically smoked per day (squared)	–	–	–	0.0001+	0.0000	-0.0000
	–	–	–	(0.0001)	(0.0000)	(0.0001)
Excellent health (1 = yes)	0.0101	0.0024	0.0010	0.0099	0.0022	0.0005
	(0.0064)	(0.0038)	(0.0034)	(0.0064)	(0.0038)	(0.0034)
Fair health (1 = yes)	-0.0255***	-0.0073+	-0.0053	-0.0255***	-0.0072+	-0.0047
	(0.0071)	(0.0044)	(0.0039)	(0.0071)	(0.0044)	(0.0038)
Poor health (1 = yes)	-0.0075	-0.0054	-0.0082	-0.0073	-0.0050	-0.0077
	(0.0114)	(0.0077)	(0.0064)	(0.0114)	(0.0077)	(0.0065)
Age (years)	0.1799***	0.2135***	0.0845**	0.1800***	0.2139***	0.0883***
	(0.0149)	(0.0154)	(0.0268)	(0.0150)	(0.0155)	(0.0268)
Age (squared)	-0.0042***	-0.0043***	-0.0018*	-0.0042***	-0.0043***	-0.0019**
	(0.0004)	(0.0004)	(0.0007)	(0.0004)	(0.0004)	(0.0007)
Age (cubic)	0.0000***	0.0000***	0.0000	0.0000***	0.0000***	0.0000+
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Married (1 = yes)	-0.0071	0.0019	-0.0042	-0.0070	0.0018	-0.0057
	(0.0114)	(0.0120)	(0.0112)	(0.0114)	(0.0121)	(0.0113)
Lives with partner (1 = yes)	0.0180+	0.0067	0.0037	0.0183+	0.0069	0.0038
	(0.0104)	(0.0099)	(0.0094)	(0.0104)	(0.0099)	(0.0095)
Widowed (1 = yes)	-0.0417	0.0166	0.0129	-0.0394	0.0162	0.0113
	(0.0343)	(0.0302)	(0.0254)	(0.0344)	(0.0303)	(0.0256)
Divorced (1 = yes)	0.0002	-0.0075	0.0189	0.0002	-0.0081	0.0142
	(0.0173)	(0.0178)	(0.0165)	(0.0173)	(0.0178)	(0.0164)
Separated (1 = yes)	-0.0086	-0.0004	0.0111	-0.0095	-0.0036	0.0010
	(0.0217)	(0.0167)	(0.0157)	(0.0217)	(0.0163)	(0.0145)
Number of children in household	-0.0325***	-0.0465***	-0.0122+	-0.0323***	-0.0461***	-0.0127+
	(0.0054)	(0.0059)	(0.0071)	(0.0054)	(0.0060)	(0.0071)
Indian, Pakistani, Bangladeshi (1 = yes)	-0.1125*	–	–	-0.1135*	–	–
	(0.0485)	–	–	(0.0485)	–	–
Non-white (1 = yes)	-0.0515+	–	–	-0.0518+	–	–
	(0.0283)	–	–	(0.0285)	–	–
educ==universitydegree	0.2361***	0.0740*	0.0532+	0.2360***	0.0730*	0.0520+
	(0.0150)	(0.0293)	(0.0274)	(0.0151)	(0.0294)	(0.0274)
Higher qualification, teacher qual., nursing qual. (1 = yes)	0.0904***	0.0271+	0.0091	0.0904***	0.0260+	0.0075
	(0.0117)	(0.0150)	(0.0175)	(0.0117)	(0.0151)	(0.0176)
A-levels (1 = yes)	0.0367**	-0.0161	-0.0120	0.0365**	-0.0172	-0.0154
	(0.0129)	(0.0184)	(0.0180)	(0.0129)	(0.0185)	(0.0180)
Commercial qualification, apprenticeship,etc. (1 = yes)	-0.0404*	0.0492	0.0014	-0.0395*	0.0484	-0.0001
	(0.0165)	(0.0316)	(0.0330)	(0.0166)	(0.0317)	(0.0331)
No qualification (1 = yes)	-0.1130***	-0.0327	-0.0640+	-0.1134***	-0.0329	-0.0695*
	(0.0181)	(0.0265)	(0.0334)	(0.0181)	(0.0268)	(0.0341)
Union member (1 = yes)	0.0825***	0.0168**	0.0129*	0.0820***	0.0171**	0.0136*
	(0.0083)	(0.0060)	(0.0059)	(0.0083)	(0.0060)	(0.0058)
Employer is civil service/central government (1 = yes)	-0.0061	-0.0059	-0.0024	-0.0060	-0.0040	-0.0016
	(0.0154)	(0.0161)	(0.0144)	(0.0153)	(0.0161)	(0.0146)
Employer is local government/town hall (1 = yes)	0.0513***	0.0412*	-0.0048	0.0512***	0.0425*	-0.0043
	(0.0133)	(0.0169)	(0.0134)	(0.0134)	(0.0170)	(0.0135)
Other employer (1 = yes)	-0.0139	0.0030	-0.0043	-0.0137	0.0042	-0.0030
	(0.0112)	(0.0115)	(0.0089)	(0.0113)	(0.0115)	(0.0090)
Workplace has 1 - 2 employees (1 = yes)	-0.1775***	-0.1032***	-0.0277	-0.1794***	-0.1027***	-0.0356+
	(0.0289)	(0.0217)	(0.0220)	(0.0288)	(0.0217)	(0.0208)
Workplace has 3 - 9 employees (1 = yes)	-0.1229***	-0.0494***	-0.0212**	-0.1230***	-0.0483***	-0.0198*
	(0.0124)	(0.0096)	(0.0082)	(0.0124)	(0.0096)	(0.0083)
Workplace has 10 - 24 employees (1 = yes)	-0.0547***	-0.0282**	-0.0019	-0.0546***	-0.0275**	-0.0010
	(0.0121)	(0.0086)	(0.0079)	(0.0121)	(0.0086)	(0.0079)
Workplace has 25 - 49 employees (1 = yes)	-0.0474***	-0.0133+	0.0034	-0.0468***	-0.0130+	0.0039
	(0.0112)	(0.0071)	(0.0062)	(0.0113)	(0.0071)	(0.0062)
Workplace has 100 - 199 employees (1 = yes)	0.0081	0.0001	0.0047	0.0080	0.0001	0.0050
	(0.0117)	(0.0069)	(0.0064)	(0.0118)	(0.0069)	(0.0064)
Workplace has 200 - 499 employees (1 = yes)	0.0240*	0.0122	0.0091	0.0246*	0.0127	0.0101
	(0.0119)	(0.0082)	(0.0072)	(0.0119)	(0.0082)	(0.0072)
Workplace has 500 - 999 employees (1 = yes)	0.0284+	0.0257**	0.0119	0.0283+	0.0255*	0.0126
	(0.0149)	(0.0099)	(0.0086)	(0.0150)	(0.0100)	(0.0087)
Workplace has 1000 or more employees (1 = yes)	0.0279*	0.0212*	0.0124	0.0285*	0.0215*	0.0127
	(0.0133)	(0.0101)	(0.0082)	(0.0134)	(0.0101)	(0.0082)
Constant	4.0586***	3.1011***	0.0320***	4.0491***	3.1601***	0.0325***
	(0.2315)	(0.2155)	(0.0051)	(0.2309)	(0.2094)	(0.0051)
Occupation class dummies	(included)	(included)	(included)	(included)	(included)	(included)
Regional dummies	(included)	(included)	(included)	(included)	(included)	(included)
No. of Obs.	22,733	22,733	10,673	22,640	22,640	10,562
R^2	0.5290	0.3300	0.0298	0.5291	0.3302	0.0283
Sig.(Model)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Coefficients, cluster-robust standard errors in parentheses. ***/**/*/+ denote significance on the 0.1%, 1%, 5% and 10% level respectively.

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