Tobacco Control Policies and Smoking Cessation: A Cross-Country Analysis

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Abstract

Tobacco control policies range from high excise taxes, to direct restrictions on smoking in public places, to the regulation of pharmaceutical products that aid smoking cessation. In this paper we depart from the standard cross-sectional approach and instead adopt a life course perspective to study the impact of tobacco control policies across countries -- Great Britain, Germany, Russia, and the United States. Of the four countries we study, Great Britain taxes cigarettes most heavily - the price of cigarettes in Great Britain are more than twice the average price in Germany, and are more than six times the average price in the Russian Federation. The U.S. has the most restrictions on smoking in public places and the least restrictions on the sale of smoking cessation products. For example, in the U.S. nicotine patches are allowed to be sold widely over-the-counter, while in Great Britain, Germany and the Russian Federation these products are available only in pharmacies or by prescription.

Given the different mixes of tobacco control policies, it is intriguing to note that the prevalence of smoking in Great Britain and the U.S. is fairly similar, while in Germany smoking rates are somewhat higher and in Russia smoking rates are very high for men but much lower for women. According to Corrao *et al*. (2000), the 1996 British smoking prevalence rate was 29 percent for males and 28 percent for females; the 1997 U.S. smoking prevalence was 28 percent for males and 22 percent for females; the 1997 German smoking prevalence was 43 percent for males and 30 percent for females; and the 1996 Russian smoking prevalence was 63 percent for males and 13 percent for females. While some part of these differences are likely due to differences in cultural norms about smoking, it is likely that the mix of tobacco control policies in each country also plays an important role.

In this paper we lay the groundwork for researchers to take advantage of large differences across countries in tobacco control policies. To do so, we first summarize available information on tobacco control policies in force in each country. We then document in several ways the rates of smoking in Germany, Great Britain, Russia, and the U.S. In particular we describe the life course patterns of smoking by men and women in each country over time. Finally, we present preliminary econometric results from a discrete time hazard model of a sample of U.S. women smokers' decisions.

I. INTRODUCTION

The World Health Organization [WHO] (1999) predicts that worldwide mortality from tobacco is likely to rise from about four million deaths a year in 1998 to about 10 million deaths a year by 2030. Most of this increase stems from tobacco use in low income countries: Murray and Lopez (1996) predict tobacco-related deaths in low income countries will more than quadruple. But the large number of current smokers in the formerly socialist economies and the established market economies mean that smoking cessation efforts in these countries remain critical for public health. For example, although smoking rates have substantially fallen in the U.S., smoking remains the leading preventable cause of death, contributing to more than 400,000 deaths annually. A recent public health initiative, *Healthy People 2010*, aims to cut the prevalence of smoking among U.S. adults in half, from the current rate of about 24 percent to 12 percent. While recent U.S. policy debates have tended to focus on how to prevent youth from starting to smoke, a recent analysis concludes that the *Healthy People 2010* objective cannot be met without large increases in smoking cessation rates (Mendez and Warner 2000).

In this paper, we depart from the standard cross-sectional approach and instead adopt a life course perspective to study the impact of tobacco control policies across four countries: Germany, Great Britain, the Russian Federation, and the U.S. Previous research in both public health and health economics has usually relied on cross-sectional data to focus on current smoking prevalence or current cigarette demand. However, the current rate of smoking in a population reflects the accumulated history of youth and adult smoking decisions. The same population smoking prevalence could reflect either a high youth smoking initiation rate combined with a high adult smoking cessation rate, or a lower but steadier pattern of life course smoking. The "smoke while young and then quit" pattern, which would be

similar to the typical life course pattern of heavy alcohol use, would lead to less tobacco-related mortality because of the health benefits of quitting (U.S. Department of Health and Human Services 1990).[1] To complicate the picture, life course smoking behavior does not seem to have reached a steady state pattern. Increases in smoking initiation have been described as an epidemic (Corrao *et al*. 2000), but there have also been important innovations in pharmaceutical smoking cessation products. As a result, current population smoking prevalence also reflects the varied patterns of smoking initiation and cessation by different birth cohorts.

Our cross country perspective allows us to describe life course smoking behavior under different mixes of tobacco control policies. Of the four countries we study, Great Britain taxes cigarettes most heavily - the price of cigarettes in Great Britain are more than twice the average price in Germany, and are more than six times the average price in the Russian Federation. The U.S. has the most restrictions on smoking in public places and the least restrictions on the sale of smoking cessation products. For example, in the U.S. nicotine patches are allowed to be sold widely over-the-counter, while in Great Britain, Germany and the Russian Federation these products are available only in pharmacies or by prescription. Given the different mixes of tobacco control policies, it is intriguing to note that the prevalence of smoking in Great Britain and the U.S. is fairly similar, while in Germany

[1] Typical life course patterns of heavy alcohol use are described by the National Institute on Alcohol Abuse and Alcoholism (1999) and the U.S. Department of Health and Human Services (2000). For example, in the U.S. National Household Survey on Drug Abuse in 1997, the rate of heavy alcohol use (defined as drinking five or more drinks per occasion on five or more days in the past 30 days) sharply drops over the life course, from 17 percent of males aged 18 to 25, to 12 percent of males aged 26 to 34, to 7 percent of males 35 and older. For females, heavy alcohol use drops from 4.3 percent for 18- to 25-year olds, to 2.8 percent for 26- to 34-year olds, to 1.4 percent for females 35 and older. Unlike smoking, heavy alcohol use creates immediate health risks (e.g., automobile crashes), so the high rates of heavy alcohol use among young males are a serious public health concern.

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II. TOBACCO CONTROL POLICIES

In this section, we provide an overview of four categories of tobacco control policies in Germany, Great Britain, the Russian Federation and the U.S.: prices and taxation; legal restrictions of advertising and sales; direct restrictions on smoking in public places; and regulation of smoking cessation products. Unless otherwise indicated, the information is taken from the *Tobacco Control Country Profiles* project (Corrao *et al*. 2000). This project is a collaborative effort of the American Cancer Society, WHO, and the U.S. Centers for Disease Control and Prevention. Using the most current

information available through May 2000, the profiles include data on tobacco economy, infrastructure for tobacco control, and available pharmaceutical treatments for tobacco dependence. We supplement the information from the profiles with information from other sources, including WHO (1997); however, the information we present below remains incomplete and may contain inaccuracies. After providing an overview of tobacco control policies, this section concludes with a discussion of the implications for cross country research on life course smoking behavior.

Prices and Taxes

Table 1 provides a snapshot of the current prices (in U.S. $) of cigarettes in Germany, Great Britain, the Russian Federation and the United States. Figure 1 shows the trends in prices in these countries from 1955 on. The current (2001) price of a pack of Marlboros ranges from a low of $0.98 in Russia to a high of $6.24 in Great Britain. The current prices in the U.S. are higher than in Germany, but as recently as 1997 the reverse was true. As can be seen in Figure 1, in both Great Britain and the U.S. cigarette prices have been fairly steadily increasing since about 1980, while in Germany the real price of cigarettes has varied over time but shows no strong trend.

Most of the differences between the countries and over time reflect differences in the excise taxes imposed on cigarettes. According to the Smoking and Health Action Foundation, as of March 1, 2000 taxes accounted for 71 percent of the price of a pack of cigarettes in Germany, 86 percent of the price in Great Britain, and 40 percent of the price in New York, the highest taxing State in the U.S. at that time. The U.S. price also includes about $0.45 per pack to cover the cost of the 1998 legal settlement between the tobacco industry and the State Attorneys General. The sum of excise taxes and legal settlement costs accounted for 52 percent of the price of cigarettes in New York. Although data

for the Russian Federation are not reported, the price of a pack of Marlboros in Russia is very close to the difference between the price and the total taxes per pack. This suggests cigarette excise taxes are minimal in Russia.

Comparing prices across countries with different standards of living is somewhat problematic. WHO suggests that it is useful to assess tobacco affordability by examining how many minutes of labor are required to purchase a pack of cigarettes. Guindon, Tobin and Yach (2002) estimate that at average wages: in Germany it requires 17 to 18 minutes of work to afford a pack of Marlboros; in Great Britain it requires 40 minutes of work; in the Russian Federation it requires 71 minutes of work; and in the U.S. it requires 17 to 20 minutes of work. Because Germany, Great Britain, and the U.S have fairly similar standards of living, looking at minutes of work required or the monetary prices of cigarettes provides a similar view of the relative affordability of cigarettes across these countries. In contrast, because average wages are so much lower in the Russian Federation, even though the monetary price of a pack of Marlboros is the lowest in Russia, the minutes of work required to earn that price are the highest of the four countries.

Restrictions on Advertising and Sales

Germany, Great Britain and the United States ban television and radio advertising of cigarettes. Russia prohibits cigarette advertising on television from 07:00 to 22:00. Germany restricts the content of cigarette advertising, for example advertisements may not create the impression that cigarettes are harmless to health and may not be targeted to youth. Germany requires that printed advertisements include a health warning that covers 10 percent of the advertisement's surface, while in Russia they are required to cover at least 5 percent. The U.S. requires that all advertisements include one of four

rotating health warning labels.

Germany, Great Britain, the Russian Federation and the U.S. require health warnings on tobacco packaging. Germany and Great Britain have adopted the European Union directive on labeling, which includes a requirement that the health warnings on cigarette packs to cover a minimum of four percent of the surface on which they were printed. Great Britain has increased this requirement to six percent. Russia requires domestically produced cigarettes to carry a health warning label, but labels are not required on imported cigarettes. The U.S. required system of four rotating messages has been in place since 1985.

Germany, Great Britain, Russia, and the U.S. prohibit the sales or distribution of cigarettes to minors. The German ban on sales to minors was enacted in 1999. WHO (1997, p. 373) notes that Russia's ban on sales to minors "is reportedly not enforced." Until recently, many observers felt there was lack of enforcement in the U.S. as well, but recent policy initiatives have sought to make the ban on sales to minors more effective. Because vending machine sales to minors are difficult to monitor, regulation or prohibition of vending machine sales is generally seen as an important step to make bans of sales to minors more effective. All four countries allow cigarettes to be sold through vending machines, but Great Britain and the U.S. regulate these sales. In Great Britain, owners of vending machines are required to prevent the machine from being used by persons under the age of 16. In the U.S., 41 States and DC place some restrictions on vending machine sales, and 19 States and DC ban vending machines in areas available to minors (Rigotti 2001, p. 152).

Direct Restrictions on Smoking in Public Places

The Russian Federation and the U.S. ban smoking in workplaces and many other public places,

but Germany and Great Britain do not. The Russian bans were enacted between 1996 and 1999. In the U.S., most of the State "indoor clean air laws" were enacted in the late 1980s and early 1990s. Differences in State laws result in what has been called a "patchwork of smoking restrictions." In 2000, half of the States restrict smoking in private workplaces, 42 States restrict smoking on public transportation, and 35 States restrict smoking in restaurants (Jacobson and Zapawa 2001, Table 8.1). Although there is no national legislation in Germany, a 1999 German High Court decision allows employers to ban smoking completely if most employees agree with the measure, and as long as acceptable smoking facilities outside the building are offered.

Regulation of Smoking Cessation Products

The U.S. has the least restrictions on the sale and advertising of smoking cessation products. For example, in the U.S. nicotine gum and nicotine patches are allowed to be sold widely over-the-counter. In Germany 2 mg nicotine gum and the nicotine patch are only available in pharmacies ("behind the counter"), while 4 mg nicotine gum requires a prescription. In Great Britain 2 mg nicotine gum is available over-the-counter, while 4 mg nicotine gum and the nicotine patch are available only in pharmacies. In Russia nicotine gum and patch are available only in pharmacies or by prescription. Advertising of nicotine gum and nicotine patches is allowed in all four countries. Buproprion, originally marketed as an anti-depressant but later marketed as a smoking cessation therapy, is available by prescription in Germany, the U.S. and the U.K.; its status in Russia is not available from Carera *et al*. (2000). Buproprion can be advertised in the U.S. but not in Germany or Great Britain.

Although more easily available in the U.S, smoking cessation products also appear to be more costly in the U.S. than in the other countries. Novotny *et al*. (2000, Table 12.4) report data from IMS

Global Services' Medical Information Database on the average price for consumers of nicotine gum and patches for Germany, Great Britain, and the U.S. In 1996, three months of nicotine replacement therapy in the form of nicotine patches cost consumers around $282 to $316 in Germany, $213 to $235 in Great Britain, and $400 to $472 in the U.S. Three months of nicotine gum cost consumers $345 in Germany, $163 to $175 in Great Britain, and $441 to $745 in the U.S.

Implications for Research on Life Course Smoking Behavior

We suggest that cross country research on tobacco control policies and life course smoking behavior will most fruitfully focus on cigarette prices and the availability of smoking cessation products. There are several reasons the life course focus on cigarette prices seems appropriate. First, the review above documents that cigarette prices show substantial variation across countries at a point in time as well as within a given country over time. Second, previous cross-sectional research suggests that the observed variation in cigarette prices probably has a substantial impact on smoking behavior. Most estimates of the price elasticity of cigarette demand lie in the range from -0.3 to -0.5 (Manning *et al*. 1991, Chaloupka and Warner 2000). Howard, the third reason for a life course focus on cigarette prices is that cross-sectional research can not shed light on all of the mechanisms involved. A standard specification uses cross-sectional data on individuals' smoking behavior to estimate a two part model, where the first part is a model of smoking participation, and the second part analyzes consumption conditional upon participation (e.g., Wasserman *et* al. 1991, Evans, Farrelly and Montgomery 1999). A typical finding is that about half of the response to price is due to changes in smoking participation and the other half is due to changes in consumption among current smokers. However, Moore (2001) points out that the standard specification lumps never smokers and former smokers together into a

single, non-smoking group. Moore demonstrates that this mis-specification can lead to serious errors in inference. Our life course approach can distinguish the impact of prices on smoking initiation from the impact of prices on smoking cessation.

For similar reasons, a life course perspective offers new potential insights into the impact of smoking cessation products. The regulation and prices of smoking cessation products vary somewhat across Germany, Great Britain, Russia and the U.S. Moreover, the process of innovation and adoption of these relatively new pharmaceutical products guarantees variation within each country over time. And similar to prices, there is suggestive but not definitive research on the role of smoking cessation products in tobacco control. Clinical research suggests that the use of nicotine replacement products has developed into an important and cost-effective smoking cessation method (Fiore *et al.,* 1994). Hu, Sung, Keeler and Marciniak (1999) estimate that a 10 percent increase in sales of nicotine replacement products will lead to a 0.04 percent reduction in cigarette sales, with the availability of nicotine patches in 1992 (as opposed to nicotine gum) leading to a further reduction of 0.076 percent. Keeler, *et al*. (1999) estimate that allowing smoking cessation products to be sold over the counter (OTC) increased consumption of nicotine patches by 50-60 percent and increased consumption of nicotine gum by 150-200 percent. Based on estimates of effectiveness from clinical studies, Keeler *et al.* estimate that OTC conversion of nicotine gum and patches led to 31,000 to 38,000 extra quits in a year. However, these studies have not been able to study directly the impact of the smoking cessation products on life course quitting behavior.

Finally, it seems unlikely that in the countries we study the measured variation in the legal restrictions of advertising and sales and direct restrictions on smoking in public places will help explain

life course smoking patterns. Overall, for most of these regulations there is much less cross-sectional and temporal variation between and within Germany, Great Britain, Russia and the U.S. The variation that exists seems unlikely to have much of an impact on smoking. A recent review of advertising restrictions concluded that "Experience has shown that restrictions on content and placement of advertising, and bans in only one or two media, are not effective." (Saffer 2000, p. 230). In response to partial advertising bans, such as the bans on television and radio advertising in Germany, Great Britain, and the U.S., cigarette manufactures typically shift to other media or promotional efforts. Saffer points out that while partial bans reduce the effectiveness of a given level of advertising spending, manufacturers can increase the level of advertising spending to offset the reduced effectiveness. Previous research also casts doubt on warning labels as a tobacco control measure, at least as currently implemented in most countries. WHO (1997, pp. 53 - 54) notes that evaluations find that the relatively small, inconspicuous and uninformative labels required in most countries are ineffective. There is more variation in legislation restricting smoking in public places across the countries and over time. However, without difficult-to-obtain information on the level of enforcement of these restrictions, it is impossible to determine the practical variation in these policies.

III. DATA - SMOKING BEHAVIOR

Germany

The German Socio-Economic Panel (GSOEP)

The GSOEP is a longitudinal survey of households begun in 1984. It was developed in a former Special Research Unit 'Sonderforschungsbereich' at the Universities of Frankfurt/Main and Mannheim in cooperation with the DIW, and initially financed by the German National Research Fund (DFG). In 1990 the DIW assumed control of the panel with funding from the Joint Federal-Land Commission for Promotion of Research Activities (Bund-Länder-Kommission für Forschungsförderung).

The GSOEP began with a sample of 6,000 households in the Western States of Germany representing a disproportionate number of non-German migrant-workers. The GSOEP attempts to collect information from all household members ages 16 and older. The GSOEP data can be weighted to represent the total population of Germany (including German and non-Germans) or a random sample of the population can be obtained by deleting all of the 'guest workers' who were originally oversampled. At present the GSOEP has data on about 14,000 individuals living in roughly 7,000 households in Germany. For a fuller discussion of the GSOEP see Wagner, Burkhauser and Behringer (1993).

The GSOEP currently has information on smoking in three waves of the data, with a fourth wave in progress. In the 1998 survey all respondents age 16 and older were asked, “Do you smoke cigarettes, cigars, or a pipe?” Separate responses, coded for each type of tobacco, were given as: “Yes, usually” or “No.” 1998 respondents also reported the average consumption per day. The 1999

survey asked all respondents age 16 and older whether they smoked "cigarettes, pipes or cigars." The possible responses were: (a) "Yes," (b) "No, but I used to smoke" and c) "No." Questions about current smoking status are available in the 2001 survey and retrospective smoking questions will be available in the 2002 survey.

Using these data, we constructed three measures of smoking for Germany. First, we used the 1998 and 1999 data to construct indicator variables of whether or not a person smoked in those years. Second, we used the information from 1998 (on current smokers) and 1999 (on current and past smokers) to construct an indicator variable to identify those individuals who had ever smoked as of 1999.

Great Britain

The British Household Panel Survey (BHPS)

The British Household Panel Survey (BHPS), carried out by the Institute for Social and Economic Research, is an annual survey of each adult (16+) member of a nationally representative sample of more than 5,000 households (approximately 10,000 individual interviews). Begun in 1991, the same individuals are re-interviewed in successive waves and, if they split-off from original households, all adult members of their new households will also be interviewed. While in a normal interview year, children are interviewed once they reach the age of 16, there is also a special survey of 11-15 year old household members from Wave 4.

Like the U.S. studies, the BHPS is a nationally representative sample of British households and individuals, initially surveyed in 1991 and resurveyed every year since. Unlike the U.S. studies, the BHPS has the advantage that current smoking status and the amount smoked is asked *each year* of

every household member over the age of sixteen. In addition, starting in 1994 a parent was asked to report whether she believed youngest three children currently smoked. In the same year, a youth For a more complete discussion of the BHPS data see Taylor et al. (1996).

Russia

The Russia Longitudinal Monitoring Survey (RLMS)[2]

The RLMS is a series of nationally representative surveys of the Russian Federation, begun in 1992 and running through 2000, designed to measure the effects of Russian reforms on the economic well-being of households and individuals (Zohoori, *et. al* 2001). The RLMS focuses on collecting information needed to determine how reforms in the Russian Federation have affected household consumption and individual health. These effects are measured by a variety of means: detailed monitoring of individuals' health status and dietary intake; precise measurement of household-level expenditures and service utilization; and collection of relevant community-level data, including region-specific prices and community infrastructure data. Data have been collected nine times since 1992.

RLMS researchers worked with the Russian State Statistical Bureau (Goskomstat) and the All-Russia Center of Preventive Medicine to upgrade the systems in place for monitoring these issues. A breakdown in the collection of statistical data was occurring throughout the former Soviet Union. In addition, it had become clear that Russian Federation data collection systems did not provide a representative profile of the economic and social dimensions of the population. The RLMS data were collected in two phases. In Phase I, the RLMS created one of Russia's first national sampling frames,

[2]The description of the RLMS data and surveys are drawn heavily from the documentation available on the RLMS web page found at www.cpc.unc.edu/projects/rlms.

allowing surveys to be representative at the national level. They recently extended their initial sample frame to develop samples that are representative at the regional and oblast levels.

Phase II of RLMS data collection began in 1994 when they switched collaborators in Russia and changed the emphasis of their effort from institution-building to providing timely, high-quality information. The new RLMS sample is smaller, but the number of primary sampling units was doubled to enhance the representativeness of the survey. See the March 1997 sampling report for a detailed review of the Phase II sample.

United States

For our analysis of US smoking patterns in section IV we use data from the University of Michigan's Panel Study of Income Dynamics (PSID). The discrete time hazard model presented in section V uses data from one of the National Longitudinal Surveys' (NLS) original cohorts first surveyed in the late 1960s. In addition to rich information on demographic characteristics and life-cycle events, in later survey waves both the PSID and the NLS collect current and retrospective information about cigarette use. The retrospective smoking questions take the form (with minor differences): "How old were you when you started smoking regularly?" and "At what age did you last smoke regularly?" The quit question is only asked of past smokers. In each data set, both current and past smokers are also asked the average number of cigarettes they smoked when they were smoking.

The Panel Study of Income Dynamics (PSID) - The PSID began in 1968 with a sample of 5,000 households, representing a disproportionate number of low-income individuals. All current PSID families contain at least one member who was either part of the original 5,000 families or born to a member of one of these families. Although the original sampling scheme disproportionately selected

individuals from low-income families, a representative sample of the United States population can be obtained by excluding the original over-sample from the data or by applying sample weights. Starting in 1997 the PSID administers its survey every other year. The PSID differs slightly from the NLS surveys because only the head and "wife" (a PSID term designating the household member with whom the head has a "significant" relationship) are asked about their cigarette consumption. Although retrospective smoking questions were not asked until the 1986 surveys, households did report, in the 1968-1972 surveys, whether the household purchased cigarettes and how much they spent on cigarettes over the previous year. Retrospective smoking questions were asked in 1986, 1999, and 2001. Using the 1986 smoking data, there are about 80,000 smoker-year observations available in the PSID for people who smoked from 1960 to 1986.

National Longitudinal Surveys, Younger Women Cohort The NLS Original Cohorts are designed to represent the civilian, non institutionalized population of each sample's sex and age cohort in the U.S. at the time of each original survey. The original NLS Young Women cohort (hereafter NLSYW68) consists of 5,159 young women who were between the ages of 14 and 24 as of January 1, 1968. Respondents were resurveyed 19 times between 1969 and 1999. As of the 1999 interview, 3,049 (59.1%) of the original sample still participate in the surveys. The data include sampling weights based on the original survey. These weights are adjusted after each subsequent interview in part to account for persons who were not interviewed. Analysis by Parnes (1992) suggests that the re-weighting scheme allows the samples to remain representative. Using the retrospective smoking information collected in 1991 and current smoking status, asked in the 1993, 1995, and 1997 surveys, these data generate approximately 30,000 smoker-year observations.

The 1991 survey includes questions on the frequency of the respondent's current and past use of cigarettes. Questions asked the age when the respondent first smoked regularly, the age when she last smoked regularly, and the number of cigarettes usually smoked a day. The 1993 questionnaire included similar questions though they focused on current smokers and the number of cigarettes smoked per day. The 1995, 1997, and 1999 surveys inquired about whether the respondent currently smokes. Surveys include several types of data including core data on the individual, data on the respondent's family and household composition as well as data, that for most respondents, allows the investigator to identify their state of residence.

Construction of Lifetime Smoking Histories

The BHPS, RLMS, PSID and NLS include questions that ask respondents to report whether or not they smoke, the age at which they started smoking regularly and, for ex-smokers, the age when (or time since) they last smoked regularly. The BHPS provides a fairly broad categorical measure of time since last smoking regularly. In the 2002 survey, the GSOEP includes retrospective questions about starting and quitting smoking that parallel the questions in the PSID. Based on these questions we can construct a lifetime smoking history for each individual. Moreover, this information combined with the age (date of birth) of the respondent and survey interview date allows us to know for each calender year (age) whether an individual was smoking or not and the calendar year (age) he or she quit smoking.

Consider for example, the construction of the smoking history of a respondent to the 2000 survey of the RLMS. If the respondent was 30 years of age when she was interviewed in 2000 and she reports in the 2000 interview that she started to smoke at age 10 and quit at age 25 then we know that she began smoking in 1980 and quit in 1995. Consequently, the retrospective smoking information data

allow us to construct, for each respondent, whether an individual is smoking in a particular calender year. Using these data we assume that each person smoked continuously between the age they reported starting and the age they reported finally quitting. This assignment obviously masks temporary quits and so is not without its shortcomings. However, our research focuses on a highly significant outcome for public health – permanent smoking cessation (prolonged abstinence).[3]

We use these smoking histories in two ways. First, in section IV we describe smoking patterns in each country over time, by gender, by age and birth cohort. Second, in section V we estimate discrete-time hazard models of smoking cessation as a function of socioeconomic characteristics, life course events, and cigarette prices.

IV. PATTERNS IN SMOKING BEHAVIOR

Cross-Sectional Smoking Prevalence

Before adopting the life course perspective to study smoking behavior, we will first review the sort of information one can glean from the standard cross-sectional views of smoking. In Figures 2 and 3 (Panels A-D), we present the sort of cross-sectional evidence typically used in existing studies of smoking behavior. Panels A-D of Figure 2 presents evidence of the fraction of men and women in ten-year birth cohorts in each sample that currently smokes. Panels A-D of Figure 3 presents evidence of

[3]Permanent cessation is an event whose occurrence can not be known for certain until a long time has passed. Consequently, we may misclassify a person who has quit temporarily as a permanent quitter. Misclassification error in the dependent variable of a logit or probit model results in estimated regression coefficients that tend to be too close to zero (Magder and Hughes 1997). In future work, we will use information on temporary quits available in some data sets to model the probability that we have misclassified a temporary quitter as a quitter. We can estimate the probability of restarting as a function of how long it has been since the person reported herself to have smoked, adjusting for other demographic characteristics. The results will be used to weight reports that someone has quit depending upon the interval between the event and the survey.

the fraction of men and women in ten-year birth cohorts in each sample that ever smoked in his or her lifetime.[4]

Figure 2 allows us to glimpse, in a single cross-section of the population, how the prevalence of smoking varies by age, sex, and across countries. For example, within each country it is apparent that fewer people smoke at older ages, that more men smoke than women smoke in almost every age group - sometimes dramatically so as in the case of Russia (Figure 2C). Panels A-D of Figure 2 also reveal the striking differences across countries in current smoking prevalence overall and within age groups. Once again, one is struck by the vast difference between Russia and the other three countries in our sample in the fraction of the population that currently smokes.

Panels A-D of Figure 3 present, in a single cross-section of the population, a view of the fraction of the population in different age groups that has ever smoked. This view of smoking behavior shows that the rate of ever smoking is fairly constant among the older birth cohorts in each country and, except for Russia, is uniformly lower among the younger age groups. Stark differences persist in the fraction of women and men who ever smoked; differences that are greater among older rather than younger age groups in all countries. Here again, compared to men, Russian women are strikingly less likely to have ever smoked at all ages than are women in the other three countries.

Epidemiological studies (*e.g.*, Hughes, Cummings and Hyland, 1999) try to use the sort of cross sectional evidence shown in Figures 2 and 3 to gain some insight into the quitting behavior of smokers - an attempt to tease out behavior that is more directly of policy interest. One method used is to take the

[4]We do not present evidence of the 11-20 year olds in the PSID because questions are asked only of household heads and their wives.

difference between the fraction of the population that ever smoked and the fraction of the population that currently smokes. By dividing this number by the fraction of the population that has ever smoked one can convert the resulting difference into the percentage of ever smokers who have quit.

We present evidence on the fraction of ever-smokers who have quit in Figure 4A and Figure 4B. Figure 4A presents evidence on quit rates of men in all four countries and age groups. Figure 4B presents similar evidence for women. While this view of cross-sectional data tells us something of policy interest - namely the fraction of people in a given age group that quit - it tells us nothing about when they quit. In addition, cross-sectional data of this sort allows for only very crude inferences to be drawn about how overall policy differences across countries (and possibly time) are correlated with observed quit behavior. Even this correlation is suspect because the differential mortality rates of smokers and non smokers selects a special sample for analysis. Consequently, we cannot distinguish in cross-sectional data what effect tobacco control policies might have had in reducing smoking at earlier life stages.

Life Course Smoking Patterns

The retrospective smoking information available or becoming available in many long-running panel studies offers a perspective on smoking behavior that has rich possibilities for learning how tobacco control policies influence behavior. As described above, we use (or will use) longitudinal data from Germany, Great Britain, the Russian Federation and the U.S. to construct lifetime smoking histories. The approach sheds light on the role of tobacco control policies on smoking behavior of an individual over his or her whole lifetime - allowing researchers to exploit significantly more variation in policies.

We present evidence on smoking behavior over each individual's life course in Figures 5-7. In Panels B-C of Figure 5 (retrospective data for the GSOEP are not yet available) we present the average life-course smoking patterns of men and women in Great Britain, Russia and the United States.[5] The pattern of life-cycle smoking behavior shown in Figures 5B, 5C, and 5D already points to ways in which policies might affect smoking behavior. The patterns shown confirm, for example, that on average, smoking initiation exceeds quitting until the mid 20's in all countries for both men and women. These averages also suggest that, in all countries, women start smoking at older ages than do men. It also shows that, in almost every country, smoking cessation begins in the late 20s and accelerates throughout the remaining life of individuals who survive to older ages. This insight suggests that researchers interested in understanding what spurs smokers to quit should consider life course events and policies that are more prevalent in these ages. Two obvious life course events are marriage and fertility.

As noted in the cross-sectional figures presented above, averaged across the whole population, rates of smoking among men exceeds that of women in all countries and at all ages. In Figures 5B, 5C, and 5D one also sees the large sex differences in smoking rates across countries - with rates of smoking of the average Russian woman being sharply lower than those of her male counterpart.

The life-course perspective on smoking behavior provides even more insights when we plot life-course smoking patterns of more narrowly defined birth cohorts. In Panels A-C of Figures 6 we plot

[5]BHPS data on when people quit is categorical in wave 9 and causes the odd patterns shown for Great Britain in Figures 5-7. Wave 12 of the BHPS, in the field in the Fall 2002 with data available in the Spring 2003, will ask ex-smokers the exact age they quit. Also note that older smokers in all countries tend to round to the nearest five-year age.

the life-course smoking patterns of men in eight ten-year birth cohorts in Great Britain, Russia, and the United States. We plot life-course smoking patterns of women in similarly defined age groups in Panels A-C of Figure 7.

In all countries and across all birth cohorts, almost all men and women started smoking in a very narrow range of years. While this fact has been observed elsewhere, the striking similarity across birth cohorts and countries with vastly different tobacco control policies suggests that the timing of decisions to start smoking has very little to do with policies. However, as seen in Figures 6B and 6D, in Great Britain and the U.S. male smoking initiation rates are lower for more recent cohorts. Over 50 percent of British and U.S. males in cohorts over the age of 50 initiated smoking, compared to 30 to 40 percent smoking initiation rates for the youngest cohorts in our data. In contrast, in Figure 6C the oldest cohorts of Russian men have the lowest smoking initiation rates, while roughly 70 percent of the younger cohorts (below the age of 50) initiated smoking. These differences across countries and cohorts suggest the potential of extending several recent studies of smoking initiation in Germany (Bantle and Haisken DeNew 2002) and the U.S. (DeCicca, Kenkel, and Mathios 2002).

Even more striking cohort differences in smoking initiation by women are seen in Figures 7B, 7C, and 7D. There we see that older cohorts of women started smoking at later ages in all three countries (Russian women being an extreme outlier). Among younger cohorts in Great Britain (Figure 7B) and the United States (Figure 7D), women began to smoke in a very narrow age range. By contrast, Figure 7D shows that successive cohorts of Russian women are smoking at higher and higher rates and that they are starting to smoke at younger ages in each successive cohort.

The life-course perspective we adopt here also reveals differences across cohorts and across

countries in the timing of quit decisions. Figures 6B and 6D show that, in the United States and Great Britain, older cohorts of men quit at slower rates than did younger cohorts (though this pattern is confused in the British data by the lack of precise information on when quits occurred). By contrast, in Figure 6C we can see that it is older Russian men who quit at faster rates (and at earlier ages) than did younger men. In addition, the data shown here suggest that younger cohorts of Russian men are not less likely to quit as is the case for younger Americans and Britons.

From Figures 7B, 7C, and 7D, smoking cessation rates among different cohorts of women in Great Britain and the U.S. show similar patterns to those observed for men. It is difficult to say much about smoking cessation patterns among different cohorts of Russian women (Figure 7C). The older cohorts of Russian women show little quitting because so few of them initiated smoking. The younger cohorts, where smoking is more common, also tend to show little quitting because they have not yet reached the age in the life course when cessation typically occurs. It is striking that smoking prevalence in the cohort of Russian women aged 31 - 40 falls from about 22 percent when they around 30 years old to about 11 percent by the time they are 40 years old.

V. DISCRETE TIME HAZARD MODEL OF SMOKING CESSATION

Overview of Data and Econometric Methods

For our preliminary study of smoking cessation, we constructed lifetime smoking histories for each respondent in the NLSYW68, consisting of the respondent's smoking status at each age through 1991, when the oldest respondents were 47.[6] Table 2 summarizes the combined smoking histories of the sample used in the empirical analysis. At younger ages, the number of smokers is driven by smoking initiation, which mainly occurs during the teen years and the early twenties. As initiation becomes infrequent and cessation becomes more common after the age of 25, the number of smokers in our sample begins to decline from its peak of 937. The cumulative number of quitters over the observed ages is 431. The annual quit rate increases fairly steadily with age, so that after the age of 40 around 4 or 5 percent of smokers quit each year.[7]

We are able to link NLS respondents to the states in which they reside for each of ages they are at risk of quitting smoking.[8] This allows us to examine the impact of cigarette prices (which include

[6]The 1993, 1995, 1997, and 1999 questionnaires included similar questions that focus on current smoking. Future work will use these data to extend the smoking histories past 1991.

[7]There appear to be spikes in the annual quit rates at ages 31 and 36 that may be survey artifacts. If respondents tended to round the age at which they last smoked regularly to 30 or 35, they would be measured as having quit at age 31 or 36.

[8] Though the NLS data does not include codes that directly link individuals to the state in which they reside this matching process can be done indirectly through the use of other variables available in the NLS. This match is especially accurate for the original 1968 survey. For those respondents who indicate that they have never moved (a variable included in the NLS) we can use a matching algorithm that produces an accurate state assignment for their entire smoking history. The algorithm is based on information included in the older cohort sample. In this sample it is possible to identify the state of residence of each member in the older cohort. In addition to this information market level information that is associated with the locality of the respondent is provided such as the unemployment rate, size of

excise taxes) and state tobacco control policies (in future work) on quitting behavior. Data on state cigarette taxes and prices by calendar year are obtained from the Tobacco Institute's publication *The Tax Burden on Tobacco.*[9]

While continuous time duration models and the associated hazard functions are often used in labor economics, the discrete time hazard model is an especially attractive specification to use to explain individual variation in quitting behavior in the NLS Young Women. At one level, we use the discrete time hazard model simply because our data are measured in discrete terms. In addition, the discrete time hazard model offers a number of technical advantages. It easily accommodates, for example, a broader set of explanatory variables that may be associated with quitting behavior, including policy-manipulable variables such as cigarette prices and life course events such as pregnancy. Because these variables change at discrete times during the duration of the smoking habit, they can be easily included in the discrete time hazard model. In contrast, it is more difficult to include time-varying covariates in continuous time duration models (Petersen 1986). While continuous time duration models impose specific functional forms on the relationship between duration and the hazard rate, the discrete time hazard model allows for more flexibility. Finally, the discrete time hazard model overcomes censoring problems that arise in continuous time duration models. Many spells of smoking observed in the NLS Young Women sample are right censored, meaning that the spell is not completed by 1991 because the

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local area labor force, index of demand for female labor. The identical market level information is provided for the young women cohort. Consequently, the market level variables can be matched to those in the older cohort who have identical values of these variables and the state value associated with these values can be assigned to the younger cohort.

[9] This is a standard source for tax and price data. The prices and taxes are adjusted for inflation using the Consumer Price Index.

woman is still smoking. Dealing with the censored observations would again introduce complications in a continuous time duration model, but is not an issue in the discrete time hazard model.

For the discrete time hazard model, the sample consists of each individual who is at risk of the event (quitting) at each age. The level of analysis is whether an individual quits at a particular age given that they were at risk of quitting (that they were a smoker). Each respondent contributes an observation to the sample every time they are at risk of quitting. Table 2 provides the number of smokers at each age. Since each smoker at each age is at risk of quitting, the number of observations is the sum of the number of smokers at each age, providing a sample size of about 20,000 smoker-years.

Hazard Model Specification and Definition of Variables

The hazard model described below by equation (1) can be thought of as a demand function for smoking cessation. The three subscripts on the variables in equation (1) represent the three major sources of variation used in this study. The subscript i represents the particular respondent, the subscript j represents the state in which the respondent resides, and the subscript t represents the current age at which the smoker is at risk of quitting. For example, for a respondent who smokes from age 18 and quits at age 27 will be in the data set ten times with t equal to 18 for their first observation, 19 for the second observation, etc. Italicized names indicate vectors of independent variables.

(1) $QUIT_{ijt} = a_o + a_1 YEAR_{ij} + a_2 AGE_{ijt} + a_3$ CIGARETTE $PRICE_{ijt}$

$+ a_4$ YEARS $SMOKED_{it} + a_5$ TIME $PREGNANT_{ijt} + a_6$ *FAMILY HEALTH SHOCKS*$_{ijt} + a_7$ *DEMOGRAPHIC CHARACTERISTICS*$_{ij} + a_8$ *STATE OF RESIDENCE* $+ e_i$

Below we describe the dependent and independent variables used in the analysis.

The Dependent Variable

The dependent variable is a 0-1 variable indicating whether the individual stopped smoking in a particular year conditional on being at risk of stopping. Formally, the dependent variable is defined as follows:

$QUIT_{ijt}$ = 1 if respondent i living in state j is smoking at age t and not smoking at age t+1

= 0 if smoking at age t and smoking at age t+1.

Independent Variables

Age and Time Factors

Quitting behavior is rare for young smokers and sharply increase over the life course. Thus, linear and quadratic age terms are key independent variables to be included in the model. Since sample members reach the same age in different calender years the model can include both age and year (calendar) effects so that cultural changes in attitudes toward smoking and advances in quitting technologies can influence the probability of quitting independently of a sample member's age. The ability to model both effects is somewhat limited because there is only a 10 year range in ages in the original sample. Consequently, we include a year effect to allow the quit rate (controlling for age) to vary over time.

AGE_{ijt} = linear and quadratic (age of respondent i residing in state j at time t)

$YEAR_{ij}$ = the year the respondent i residing in state j is in the sample.

State Cigarette Prices

The variable *Cigarette Price*$_t$ is the average price individual i residing in state j faces at age t. Cigarette prices in November of each year by state are available from the Tobacco Institute. The price of cigarettes in a calendar year by state is measured as the average of the price in November of that year and the price in the preceding November. Each individual is then assigned the weighted average of the prices for the calendar years during which the individual is age t, where the weights are based on the individual's birth date to reflect the portion of each calendar year spent at age t.

Smoking Duration

Equation (1) also includes a variable measuring how many years the respondent smoked prior to year t. This allows the hazard model to explicitly deal with duration dependence, although only in a linear specification.[10] In the current version of the model we include:

$YEARS\ SMOKED_{it}$ = the number of years individual i residing in state j has been smoking prior to age t.

Pregnancy

Since pregnancy may change decisions about smoking we include the following variable.

$TIME\ PREGNANT_{ijt}$ = the proportion of the year respondent i, residing in state j is pregnant at age t.

[10]In future models we will examine quadratic terms and also how the major policy variables, such as prices and warning labels differentially affect those who have been smoking for different lengths of time.

The average value of time pregnant is equal to 0.056 of a year.

Family Health Shocks

Equation (1) includes a set of variables to capture two channels through which the death of a parent might influence smoking cessation decisions. There are two indicator variables for the recent death of the respondent's father and mother. These are specific to the age of the respondent, to explore the hypothesis that because of the additional psychological stress a parent's death makes an individual less likely to quit smoking. Two additional variables indicate whether the respondent's father or mother ever died of a smoking-related illness. These indicator variables take a value of one upon a death due to a smoking-related illness and continue to take a value of one for all subsequent time periods (ages). These are included to explore the hypothesis that a parent's death due to certain illnesses provides important information to the respondent of the value of quitting smoking. Smoking-related illnesses are defined as heart disease, cancer, emphysema, chronic bronchitis, or asthma. The definition of these variables does not reflect the smoking status of the parent.[11] In one sense, this creates a measurement error problem, because non-smoking parents who die of these diseases are classified as having died of a smoking related illness. On the other hand, it could also be argued that a parent's death due to one of these diseases signals a high family risk, so even if the parent did not smoke it increases the incentives for the daughter to quit smoking.

Demographic and Other Characteristics

There are a number of demographic characteristics available in the NLS data. In this

[11]In future work, we will be able to use information on parents' smoking status for the subset of the NLS Young Women sample who can be matched to their parents in either the NLS Older Men or the NLS Mature Women samples.

preliminary version of the model we focus on racial and ethnic differences in quit behavior.

State of Residence (State Fixed Effects)

Equation (1) is estimated with and without state fixed effects. The state fixed effects are included to capture the influence of unobserved differences across states in policies and anti-smoking sentiment. State fixed effects allow for a separate shift in the hazard rate for each state so that unobserved state heterogeneity is reflected in these intercept terms. These state fixed effects imply that the impact of prices on quitting behavior is estimated only from within state variation in prices. Since we use a long time period, there is potentially a large amount of variation in cigarette prices over time in each state.

Preliminary Results

Tables 3 and 4 presents results from different specifications of the basic discrete time hazard model. Table 3 presents results from the basic model, while Table 4 presents results from the model that includes duration of smoking as an explanatory variable. Each table presents results from two specifications, corresponding to models with and without state fixed effects.

Price is positively correlated with the probability of quitting. Coefficient estimates range from 0.316 to 0.675, but only two of the four coefficient estimates are different from zero at conventional levels of statistical significance.

A more robust result is that women who are pregnant (measured as the percentage of the year that they are pregnant) have significantly higher quit rates than those who are not pregnant. The significant health consequences of smoking while pregnant are well documented. In future work we will examine whether the estimated relationship between pregnancy status and quit rates differs for women whose pregnancy occurred before and after the legislated requirement of warning labels directed at

pregnant women.

The estimated coefficients on the time trend variable indicate that, independent of age, quit rates are increasing over time. In future models we will explore the shape of these time relationships and we will investigate whether they can be explained by policy initiatives. For example, we will examine whether there was a shift in quit rates after new warning labels were introduced. Somewhat surprisingly, after controlling for the time trend, there is not a strong relationship between the probability of quitting and the linear and quadratic age variables. As noted above, the 10 year range in ages limits our ability to identify separate calendar time and life course effects.

Blacks and American Indians are revealed to have significantly lower hazard rates of quitting compared with whites. This result is especially noteworthy because of recent evidence that the rate of smoking onset by young blacks is beginning to rise.

The results for the family health shock variables provide some support for the hypothesized relationships. The recent death of the respondent's father or mother is associated with a lower probability of quitting smoking. Although the estimated coefficients are not different from zero at conventional levels of statistical significance, the direction of the relationship is consistent with stress due to a parent's recent death making it harder to quit smoking. Controlling for the impact of a recent death, a father's death due to smoking related illness is associated with a higher probability of quitting, but this is not true for a mother's death due to smoking related illness. A possible explanation is that a father's death from these illnesses carries more information content about the hazards of smoking, because smoking prevalence was probably low among the mothers of the NLS Young Women cohort..

Finally, the results in Table 4 indicate that women who have smoked longer are also less likely

to quit. As in other contexts, the interpretation of this association is problematic. In future models we will attempt to distinguish state dependence, which in this context would be consistent with nicotine addiction, from heterogeneity (Heckman 1991). We will also examine the interaction of this duration variable with the other key factors such as prices.

VI. CONCLUSIONS

While cross-sectional data yield an interesting snapshot of smoking behavior for the population that survives to that point, the information revealed is of limited policy use because it confounds many aspects of smoking behavior that policy levers seek to affect. Smoking prevalence rates are uninformative about differences in smoking initiation versus smoking cessation. The prevalence of ever-smokers who have quit is uninformative about when smokers quit. In section IV we use our new approach to document dramatic differences in life course smoking behavior of different cohorts of men and women in Great Britain, the Russian Federation and the U.S.

In section V we present preliminary econometric results that suggest that higher cigarette prices, pregnancy, father's death due to a smoking-related illness, and race/ethnicity may be important factors in U.S. women's decisions to quit smoking. The results also suggest that the probability of quitting is increasing over time. While the results are still too preliminary to draw firm conclusions, the analysis points to the richness and potential of retrospective smoking histories from on-going longitudinal studies. In future work we will extend our analysis in a number of directions, to both address the role of specific public policies in encouraging smoking cessation, as well as to provide a more general understanding of smoking cessation decisions in a life course context.

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Table 1: Current Price of Cigarttes in German, Great Britain, Russia and the U.S.								
	Local Brand				Marlboro			
	Germany	Great Britain	Russia	U.S.	Germany	Great Britain	Russia.	U.S.
March 2001	$2.75	$6.25	$0.59	$3.60	$2.81	$6.24	$0.98	$3.71
Autumn 1999	$2.79	$6.27	$0.49	$3.26	$2.87	$6.27	$0.81	$3.38
1997	$3.18	$5.27		$1.90				

Sources:

March 2001 prices: Guindon, GE, S Tobin and D Yach (2002).

Autumn 1999 prices: Corrao *et al.* (2000).

1997 prices: Sweanor (1998).

Table 2 - Number of NLS Respondents Who Are Smoking and Quit by Age								
Age	Number of Smokers	Number of Quitters	Quit Rate (%)		Age	Number of Smokers	Number of Quitters	Quit Rate (%)
10	1	0	0		29	834	19	2.23
11	2	0	0		30	831	12	1.42
12	7	0	0		31	771	34	4.22
13	23	0	0		32	778	7	0.89
14	55	1	1.79		33	774	9	1.15
15	104	0	0		34	754	11	1.44
16	210	0	0		35	740	9	1.2
17	296	0	0		36	705	35	4.73
18	486	3	0.61		37	691	16	2.26
19	608	2	0.33		38	665	16	2.35
20	767	7	0.90		39	620	23	3.58
21	873	13	1.47		40	542	27	4.75
22	921	18	1.92		41	456	26	5.39
23	931	13	1.38		42	381	14	3.54
24	927	10	1.07		43	320	15	4.48
25	937	13	1.37		44	253	18	6.64
26	918	17	1.82		45	203	9	4.25
27	890	12	1.33		46	151	8	5.03
28	868	8	0.91		47	104	6	5.45

Notes: Quit rate = 100 x (number of quitters)/ (number of smokers + number of quitters).
Source: Authors' calculations from the NLS Young Women Cohort -1968.

Table 3 - Discrete Time Hazard Model of Quit Behavior				
	Without State Fixed Effects		With State Fixed Effects	
Variable	Coefficient	Standard Error	Coefficient	Standard Error
Intercept	-150.4**	31.1004	-139.1**	36.9398
age	-0.0181	0.0639	0.0204	0.0696
age squared	0.0306	.0889	-0.0302	0.0981
Year Trend	0.0739**	0.0182	0.0677**	0.0192
Cigarette Price at age t	0.3167	0.2329	0.6645**	0.3098
Time Pregnant During age t	0.7119**	0.3070	0.7332**	0.3085
American Indian	-0.4712**	0.1925	-0.4910**	0.2001
Black	-0.3652**	0.1489	-0.1728**	0.0516
Hispanic	-0.0507	0.3671	-0.1647	0.3792
Other Race	-0.0902	0.1376	-0.1678	0.1442
Death of Dad at respondent's age t	-0.5804	0.4177	-0.5927	0.4190
Death of Mom at respondent's age t	-0.6165	0.5910	-0.6027	0.5921
Death of Dad Smoking Related Illness	0.2583**	0.1166	0.2668**	0.1197
Death of Mom Smoking Related Illness	0.0844	0.1598	0.1003	0.1640
Sample Size -2*Log-Likelihood	20942 4078.568**		20942 4032.406**	

** $p < 0.05$, * $p < 0.10$

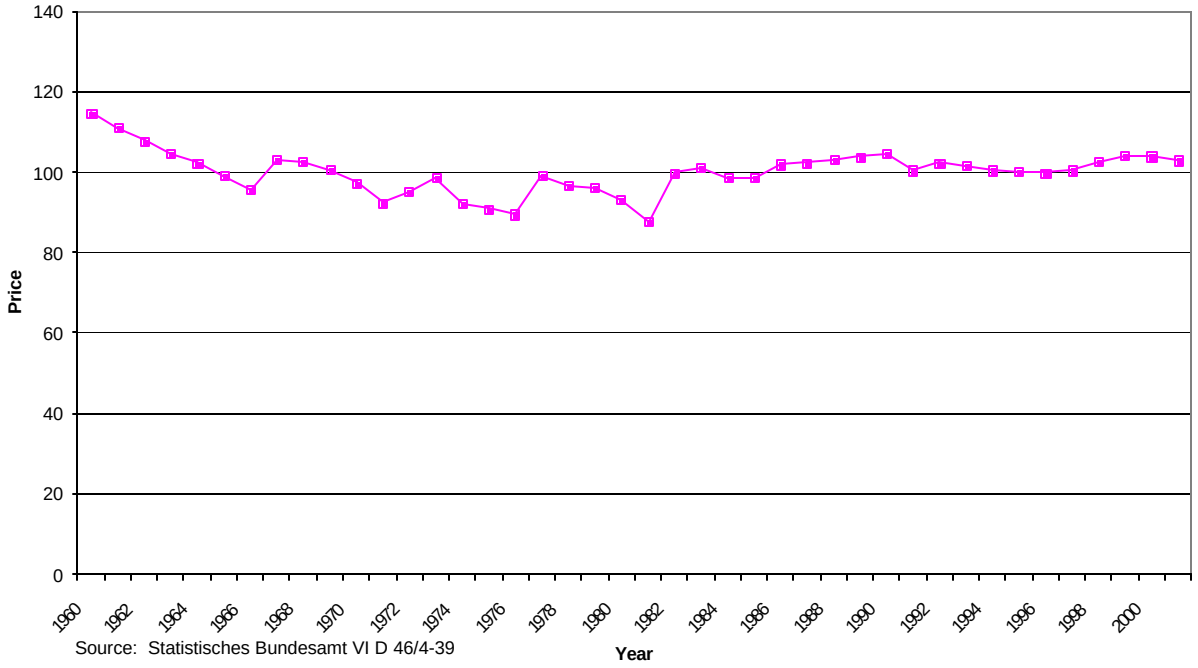
Source: Authors' calculations from the NLS Young Women Cohort -1968.

Table 4 - Discrete Time Hazard Model of Quit Behavior With Duration				
	Without State Fixed Effects		With State Fixed Effects	
Variable	Coefficient	Standard Error	Coefficient	Standard Error
Intercept	-154.3**	35.1366	-146.8**	37.0516
age	0.0274	0.0652	0.0557	0.0705
age squared	0.0349	0.0902	-0.0116	0.0991
Year Trend	0.0755**	0.0182	0.0713**	0.0193
Cigarette Price at age t	0.4084*	0.2343	0.6745**	0.3105
Duration of Smoking	-0.0610**	0.0095	-0.0597**	0.0099
Time Pregnant During age t	0.7180**	0.3073	0.7364**	0.3087
American Indian	-0.4012**	0.1930	-0.4169**	0.2006
Black	-0.4127**	0.1396	-0.3714**	0.1496
Hispanic	-0.1631	0.3709	-0.2471	0.3814
Other Race	-0.0117	0.1385	-0.0790	0.1452
Death of Dad at respondent's age t	-0.5687	0.4181	-0.5651	0.4192
Death of Mom at respondent's age t	-0.5802	0.5917	-0.5598	0.5928
Death of Dad Smoking Related Illness	0.2883**	0.1170	0.2828**	0.1203
Death of Mom Smoking Related Illness	0.0916	0.1610	0.1010	0.3725
Sample Size -2*Log-Likelihood	20942 4041.208**		20942 3999.068**	

** $p < 0.05$, * $p < 0.10$

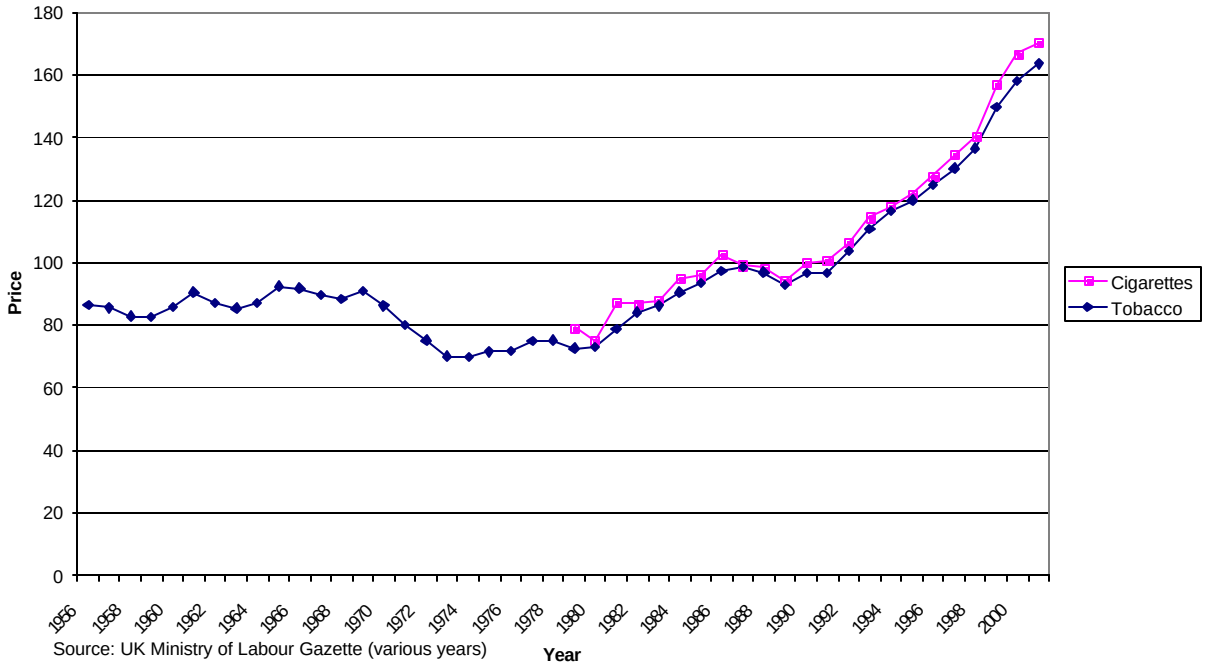
Source: Authors' calculations from the NLS Young Women Cohort -1968.

Figure 1A
Price of Cigarettes in Germany
1995=100



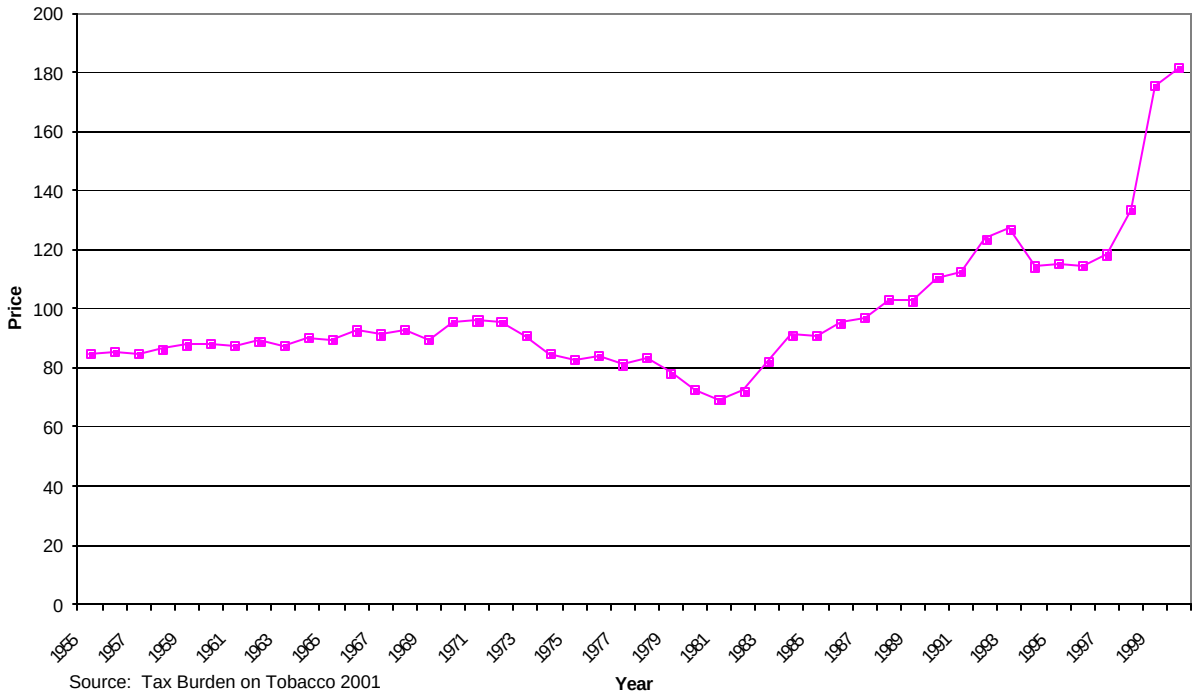
Source: Statistisches Bundesamt VI D 46/4-39

Figure 1B
Prices of Cigarettes and Tobacco Products in the United Kingdom
1987=100



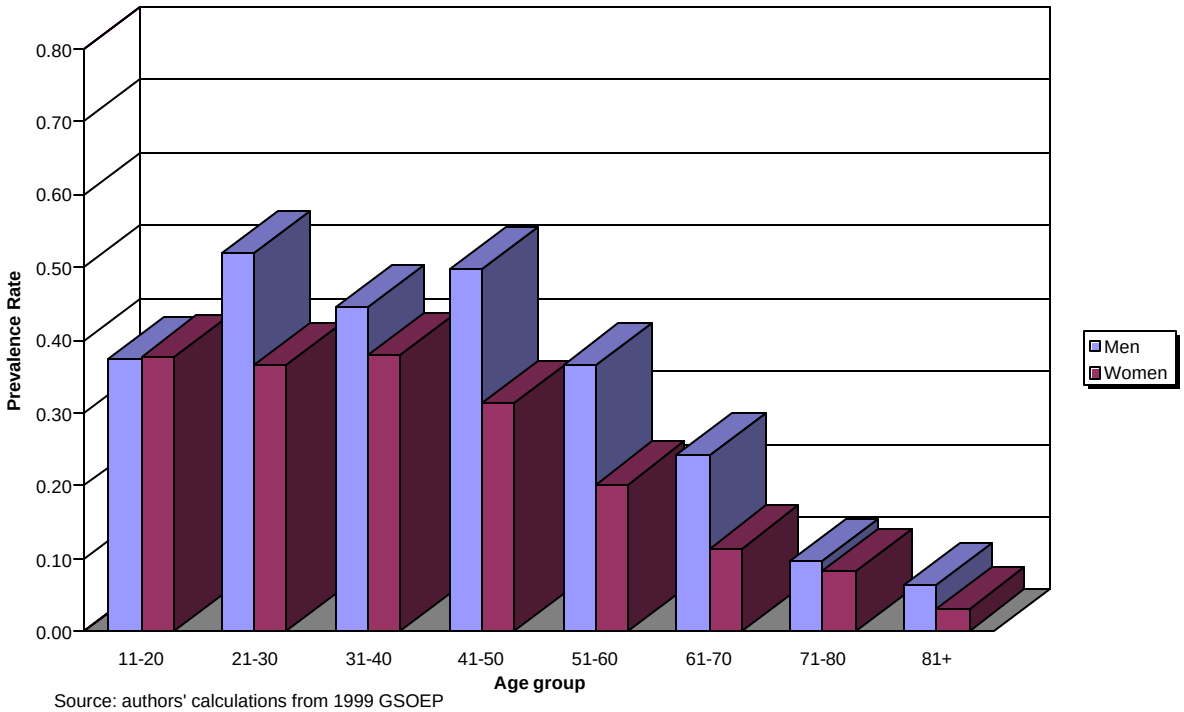
Source: UK Ministry of Labour Gazette (various years)

Figure 1D
Price of Cigarettes in the United States



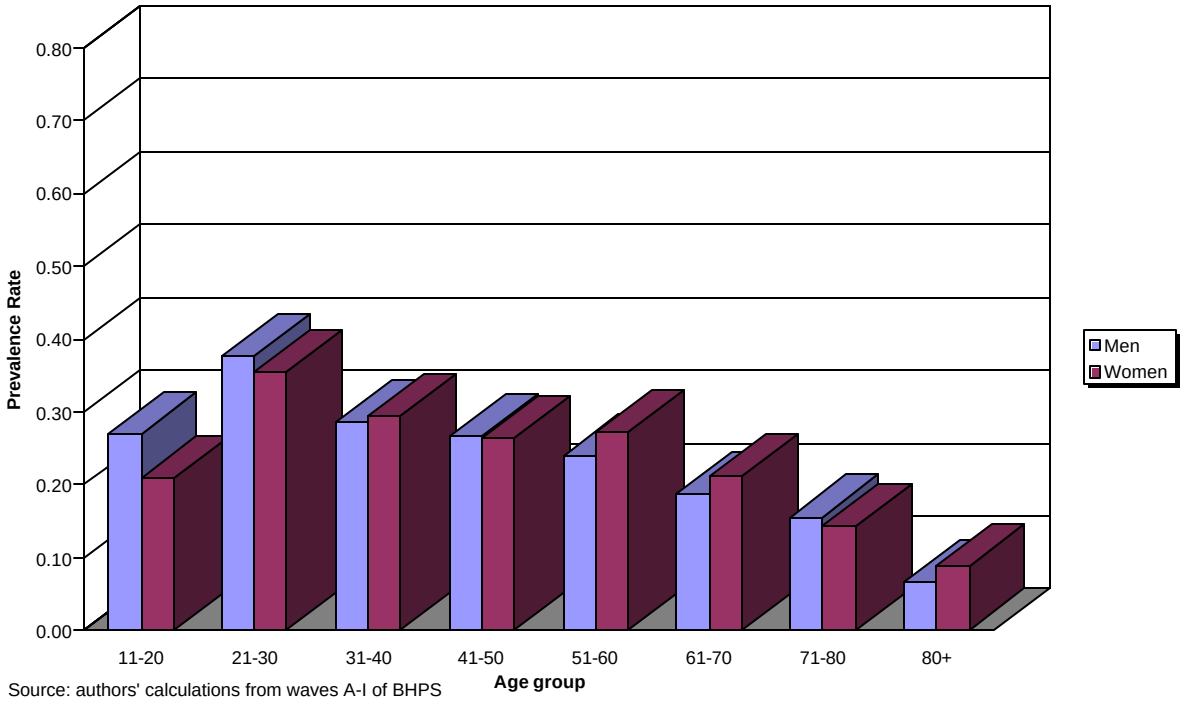
Source: Tax Burden on Tobacco 2001

Figure 2A
Cross-Sectional Prevalence of Current Smoking in Germany, by sex and cohort



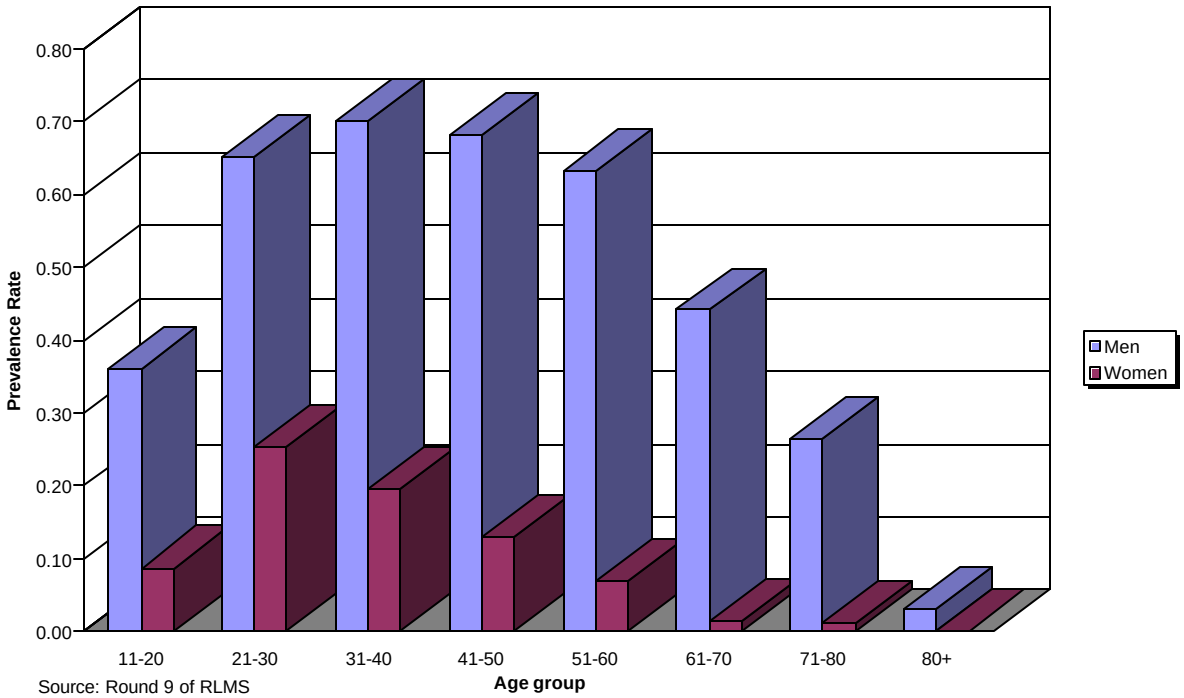
Source: authors' calculations from 1999 GSOEP

Figure 2B
Cross-Sectional Prevalence of Current Smoking in Great Britain, by sex and cohort



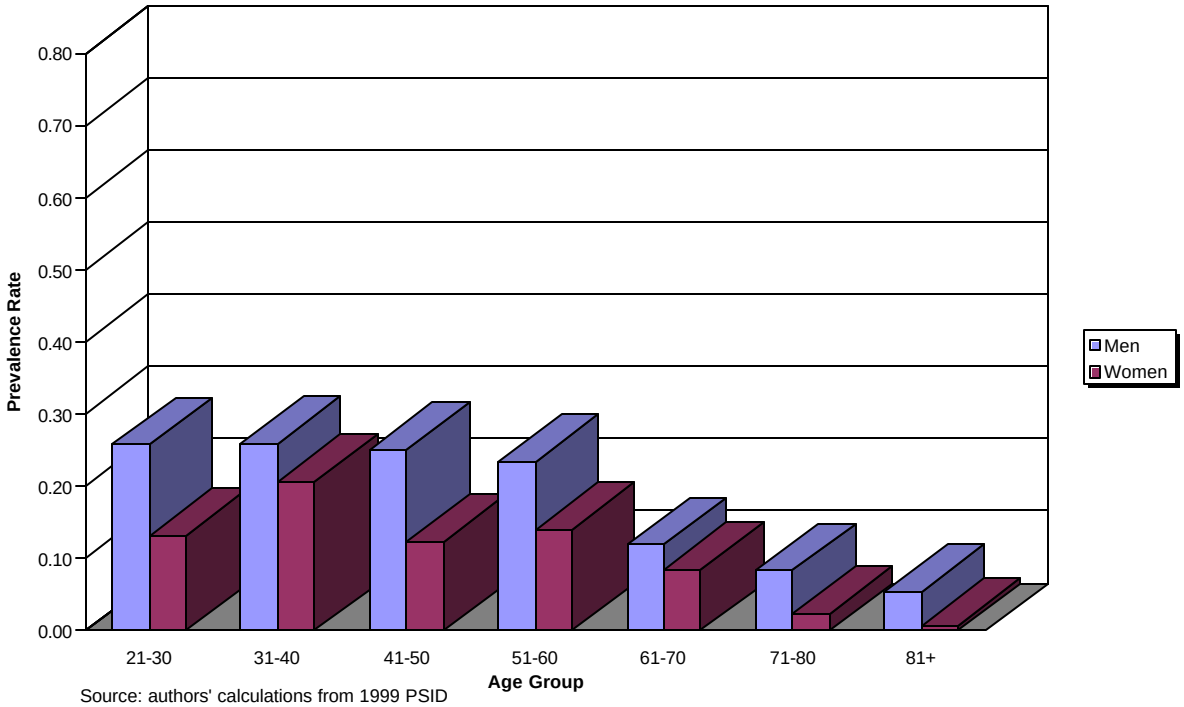
Source: authors' calculations from waves A-I of BHPS

Figure 2C
Cross-Sectional Prevalence of Current Smoking in Russia, by sex and cohort



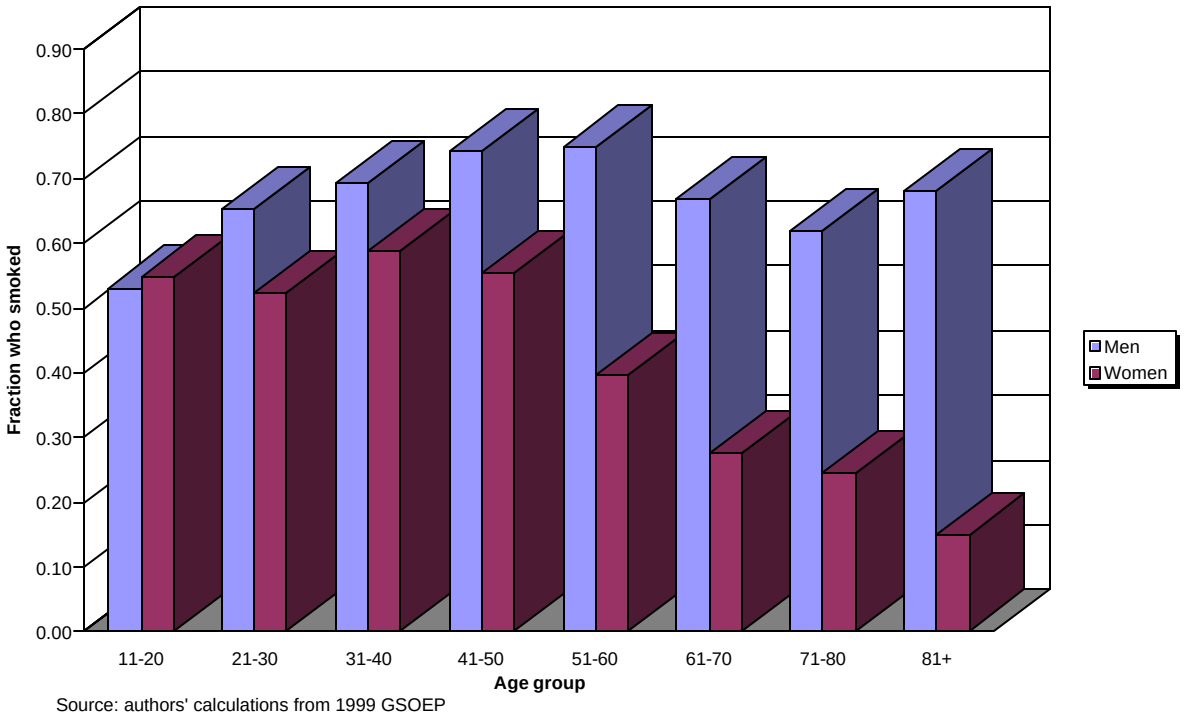
Source: Round 9 of RLMS

Figure 2D
Cross-Sectional Prevalence of Current Smoking in the United States, by sex and cohort



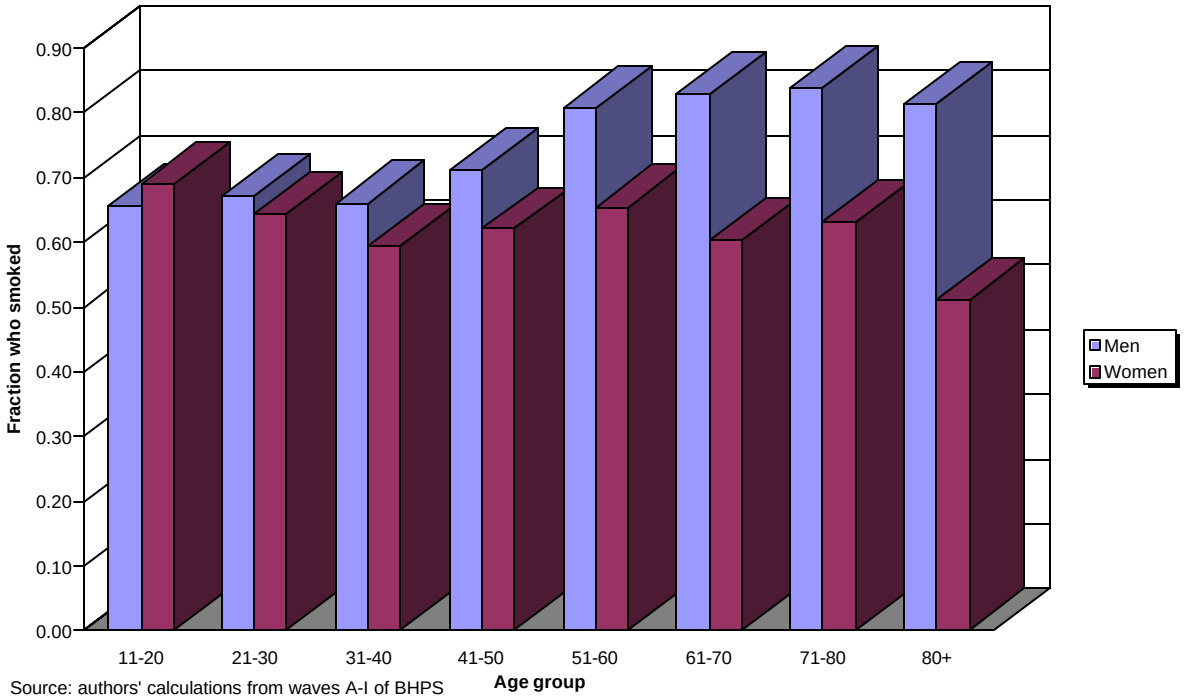
Source: authors' calculations from 1999 PSID

Figure 3A
Cross-Sectional Prevalence of Ever Smokers in Germany, by sex and cohort



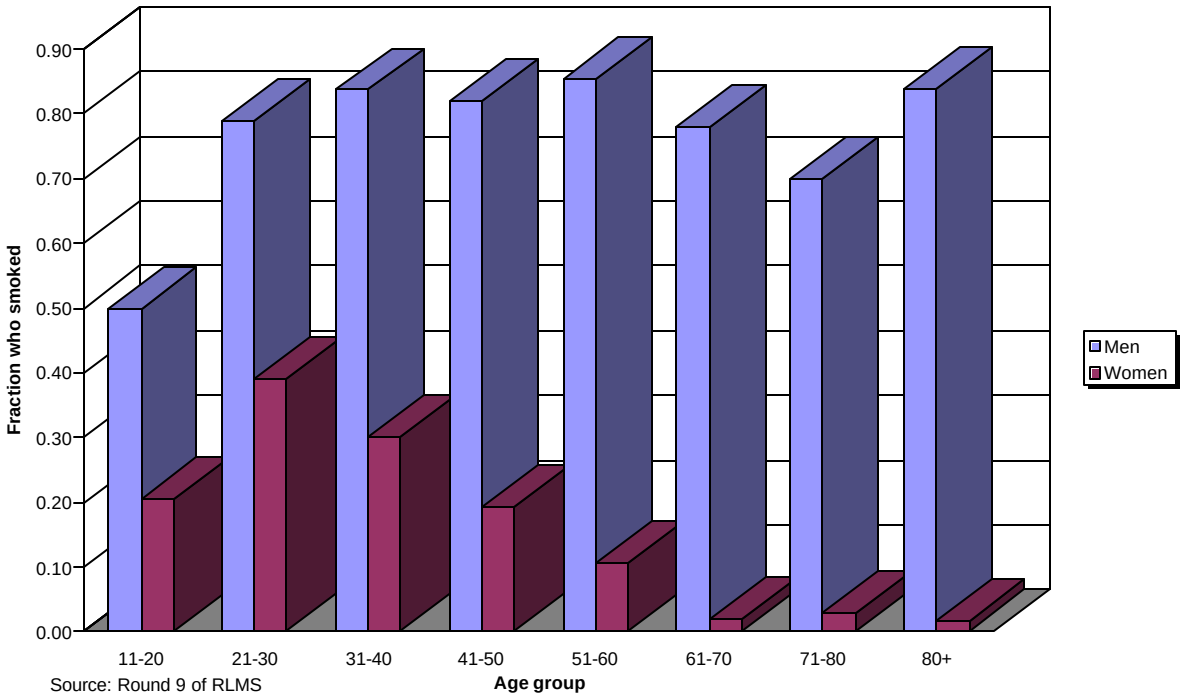
Source: authors' calculations from 1999 GSOEP

Figure 3B
Cross-Sectional Prevalence of Ever Smokers in Great Britain, by sex and cohort



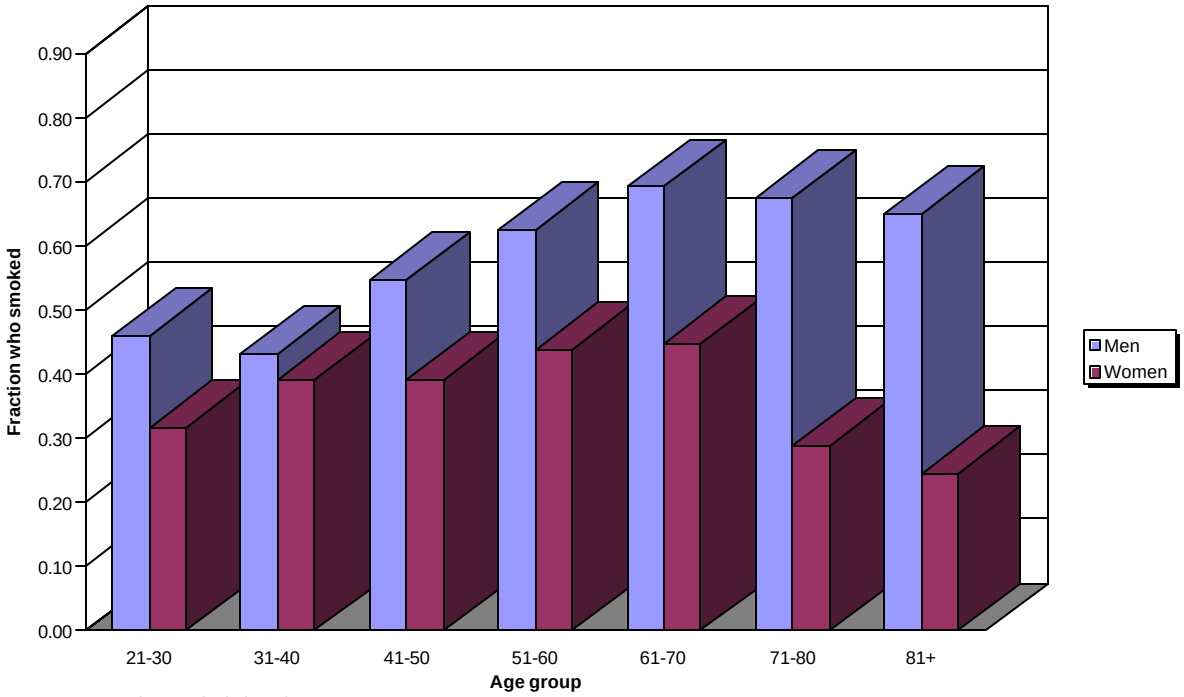
Source: authors' calculations from waves A-I of BHPS

Figure 3C
Cross-Sectional Prevalence of Ever Smokers in Russia, by sex and cohort



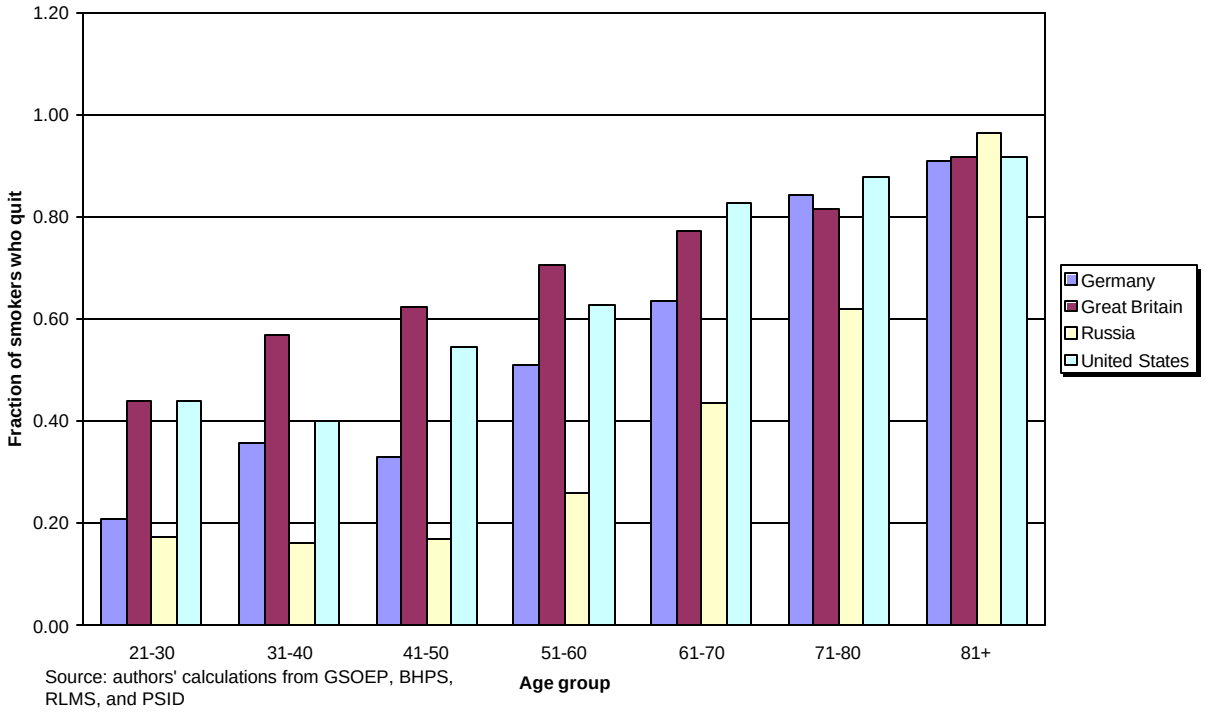
Source: Round 9 of RLMS

Figure 3D
Cross-Sectional Prevalence of Ever Smokers in the United States, by sex and cohort



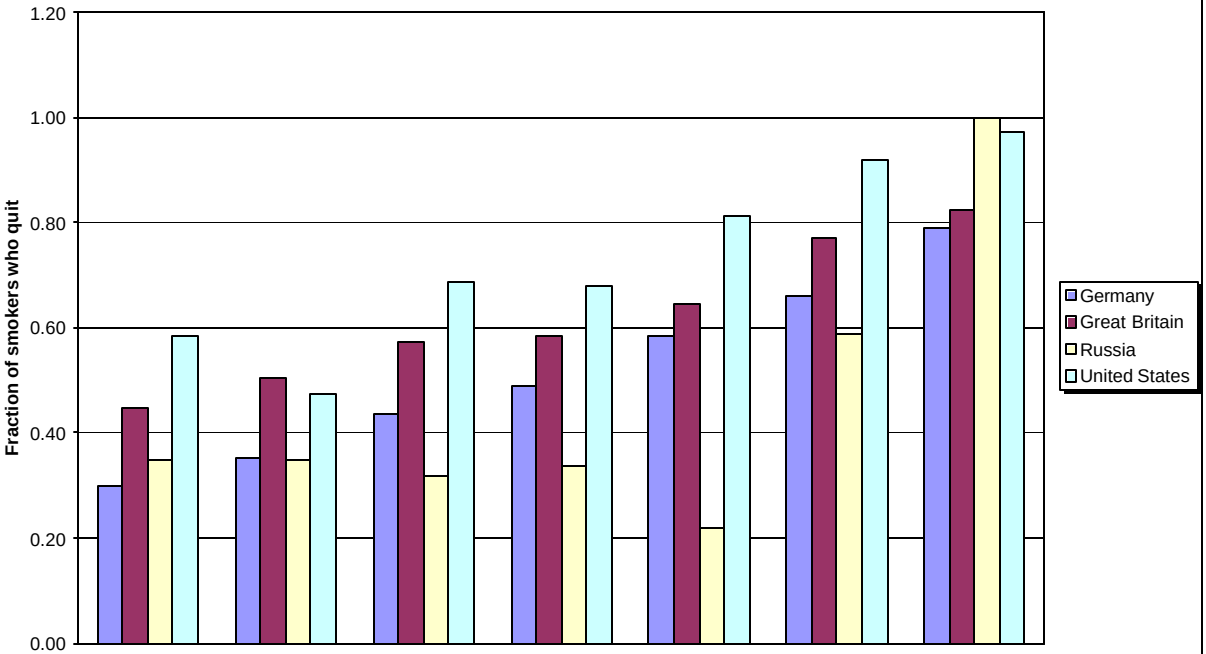
Source: authors' calculations from 1999 PSID

Figure 4A
Fraction of Male Ever Smokers Who Quit, by country and cohort



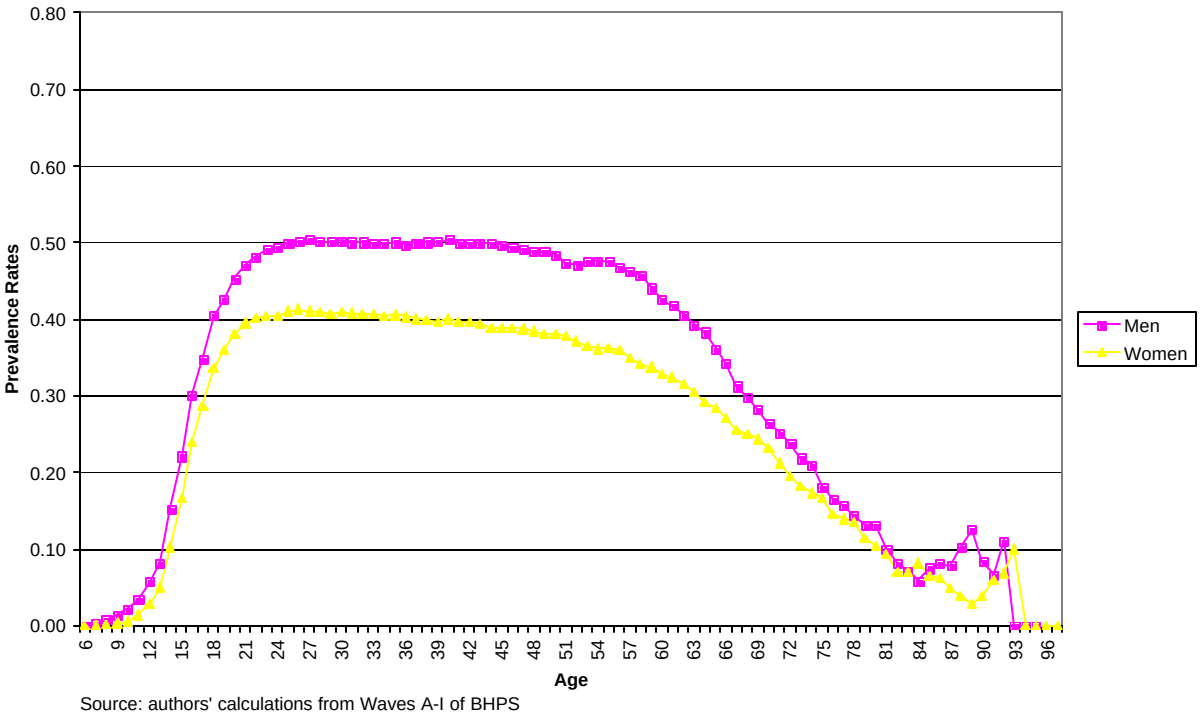
Source: authors' calculations from GSOEP, BHPS, RLMS, and PSID

Figure 4B
Fraction of Female Ever Smokers Who Quit, by country and cohort



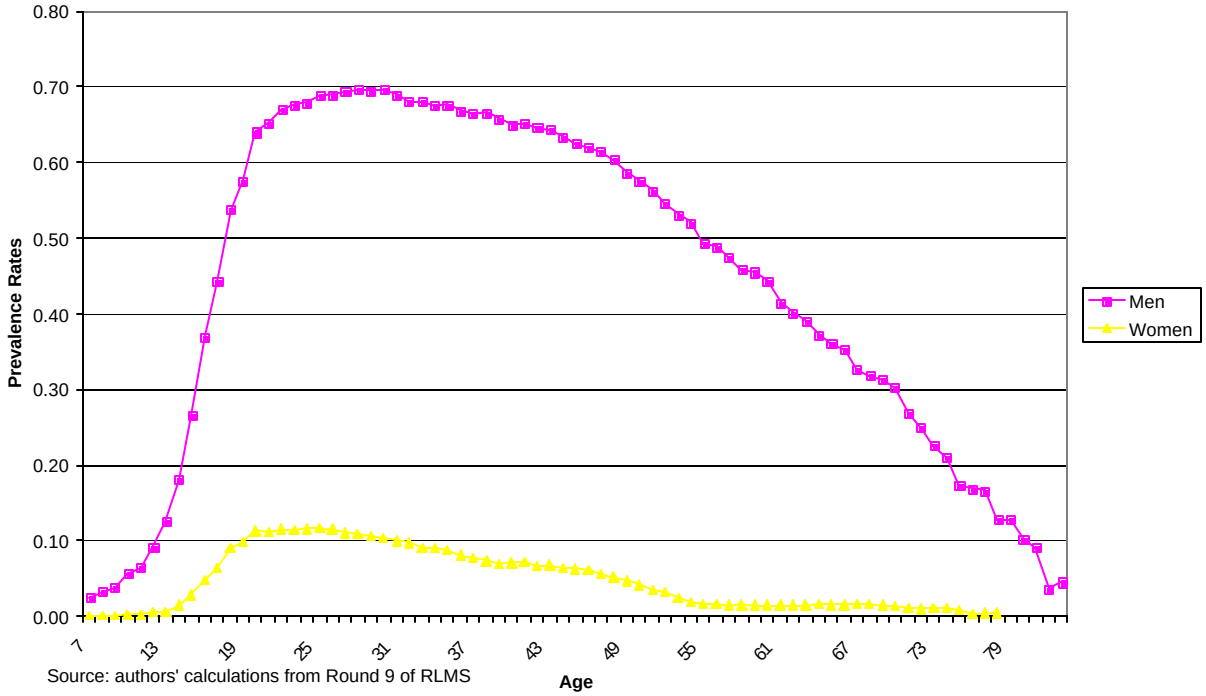
Source: authors' calculations from GSOEP, BHPS, RLMS, and PSID

Figure 5B
Average Life-Course Smoking Patterns in Great Britain, by sex



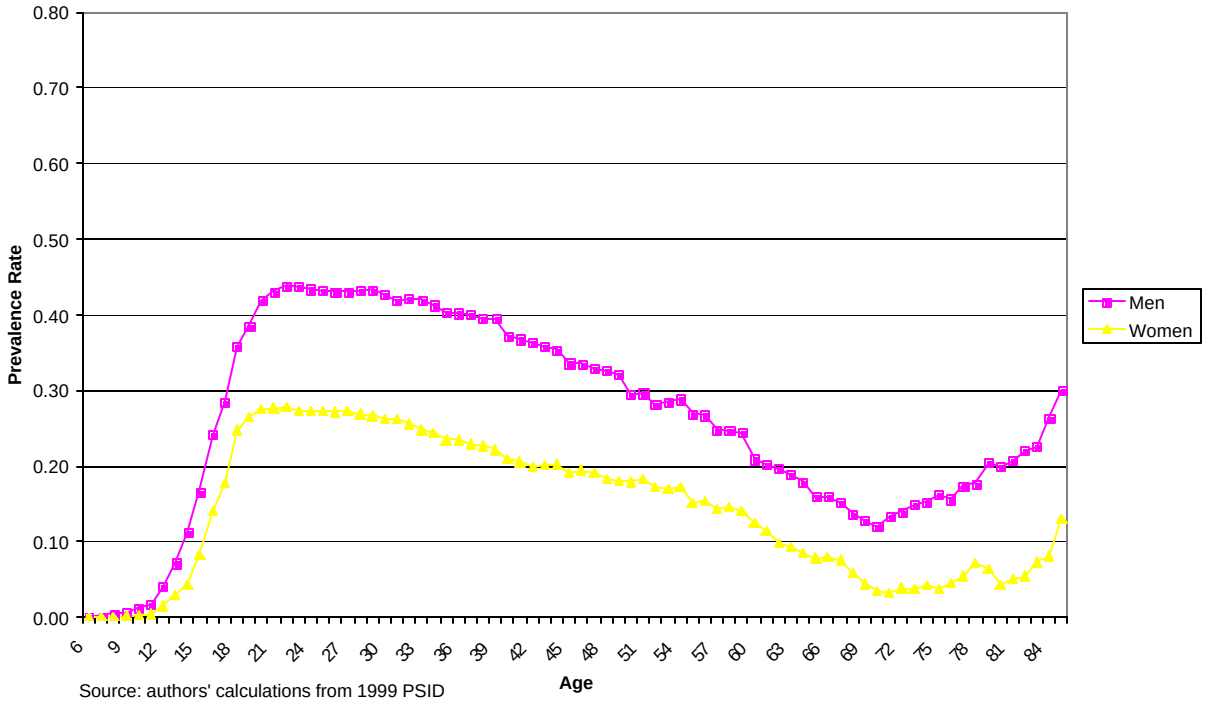
Source: authors' calculations from Waves A-I of BHPS

Figure 5C
Average Life-Course Smoking Patterns in Russia, by age and sex



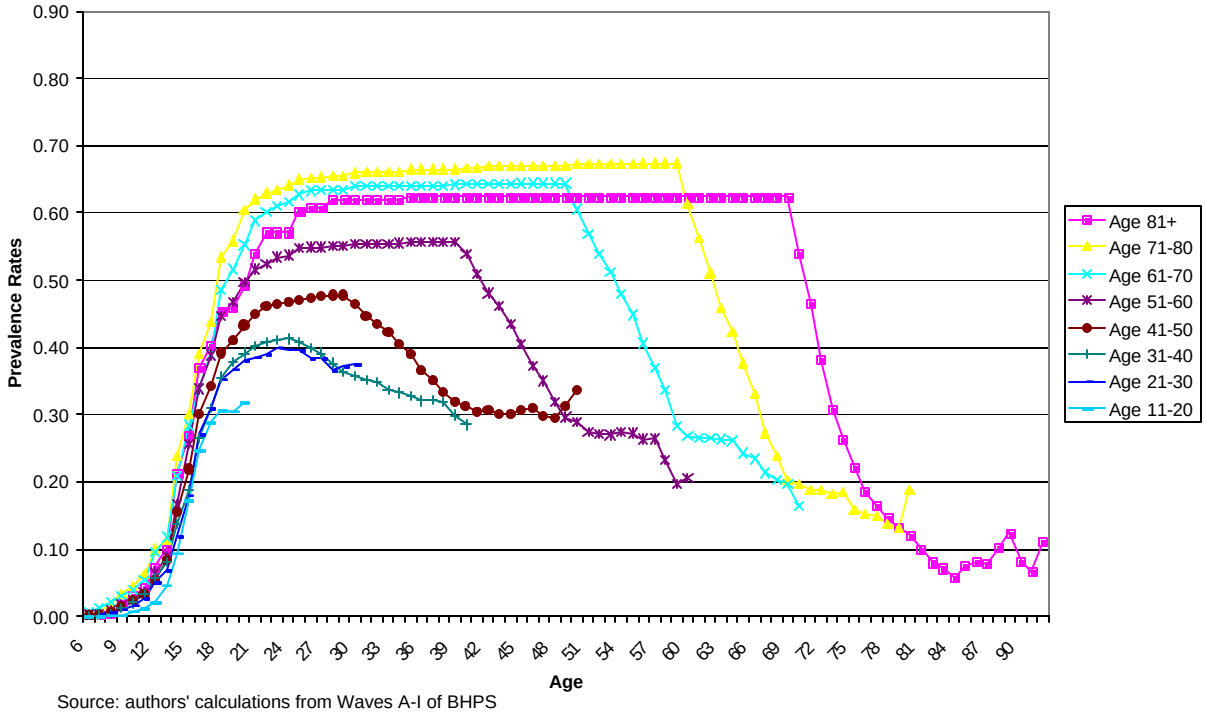
Source: authors' calculations from Round 9 of RLMS

Figure 5D
Average Life-Course Smoking Patterns in the United States, by sex



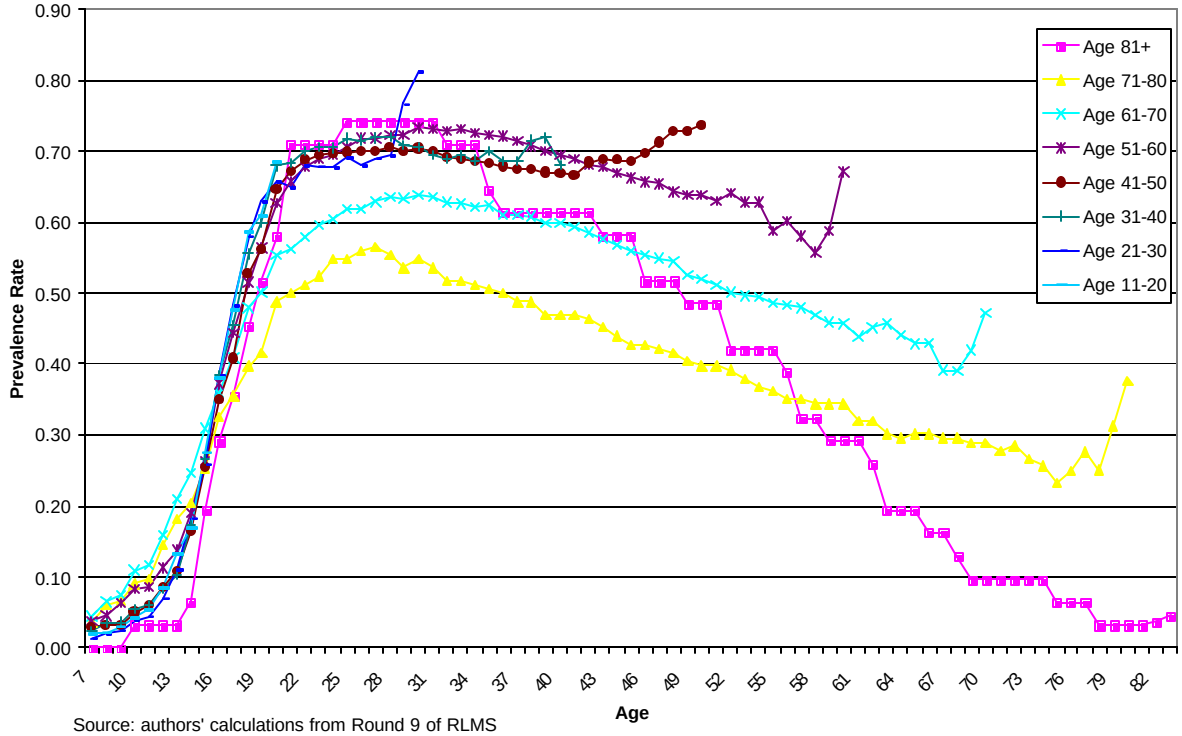
Source: authors' calculations from 1999 PSID

Figure 6B
Life-Course Smoking Patterns of British Men, by Cohort



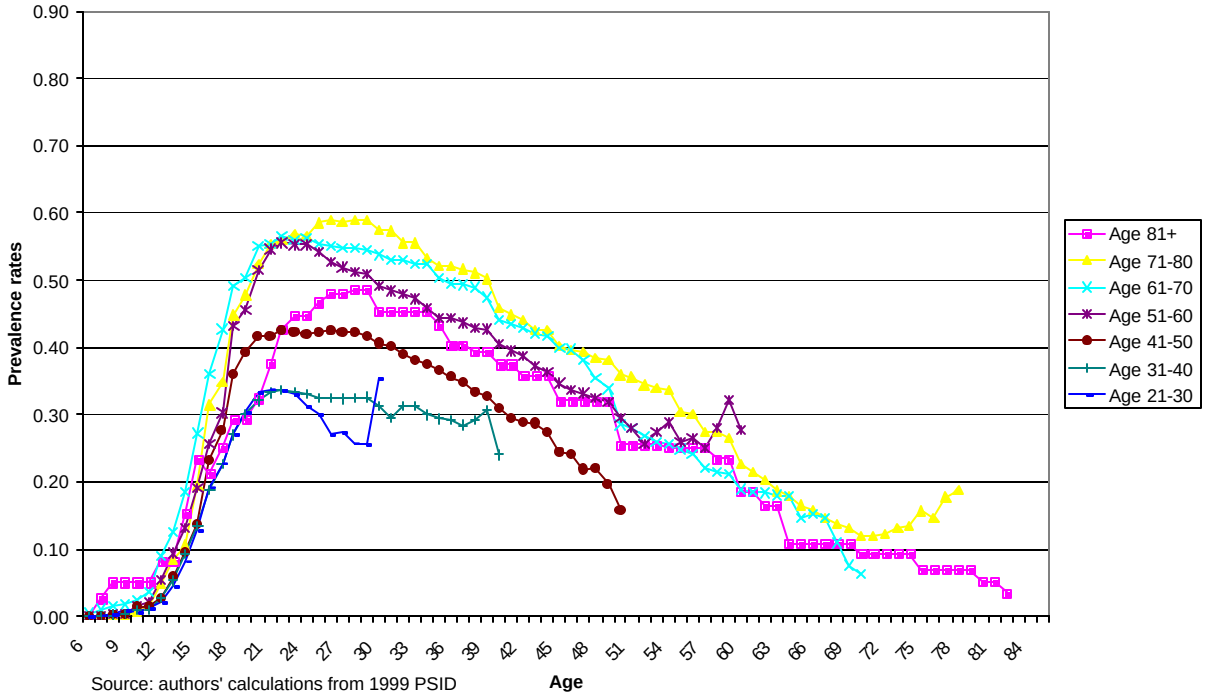
Source: authors' calculations from Waves A-I of BHPS

Figure 6C
Life-Course Smoking Patterns of Russian Men, by Cohort



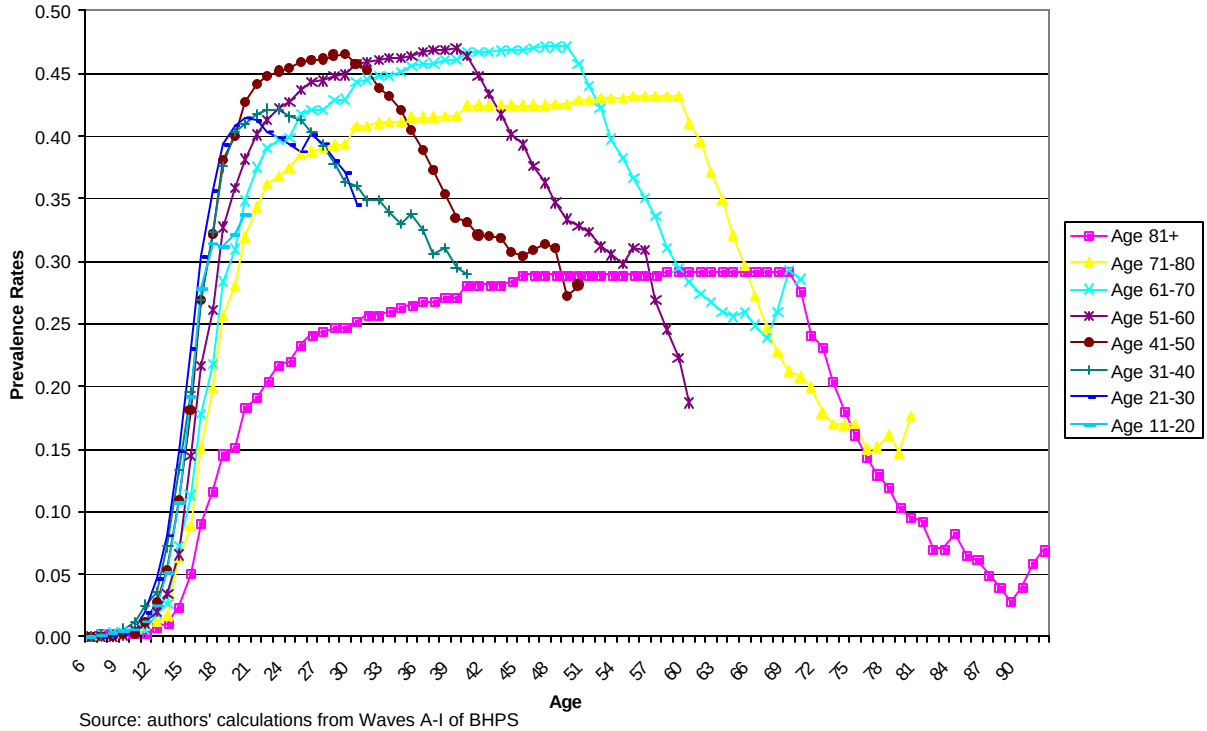
Source: authors' calculations from Round 9 of RLMS

Figure 6D
Life-Course Smoking Patterns of United States Men, by Cohort



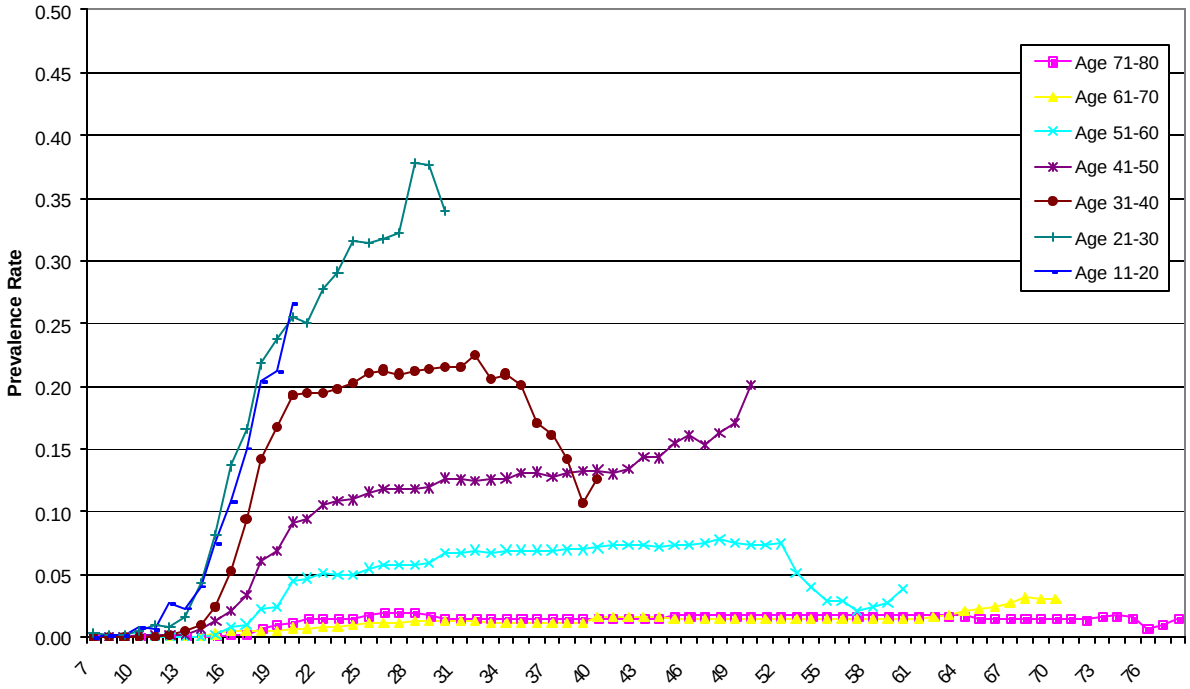
Source: authors' calculations from 1999 PSID

Figure 7B
Life-Course Smoking Patterns of British Women, by Cohort



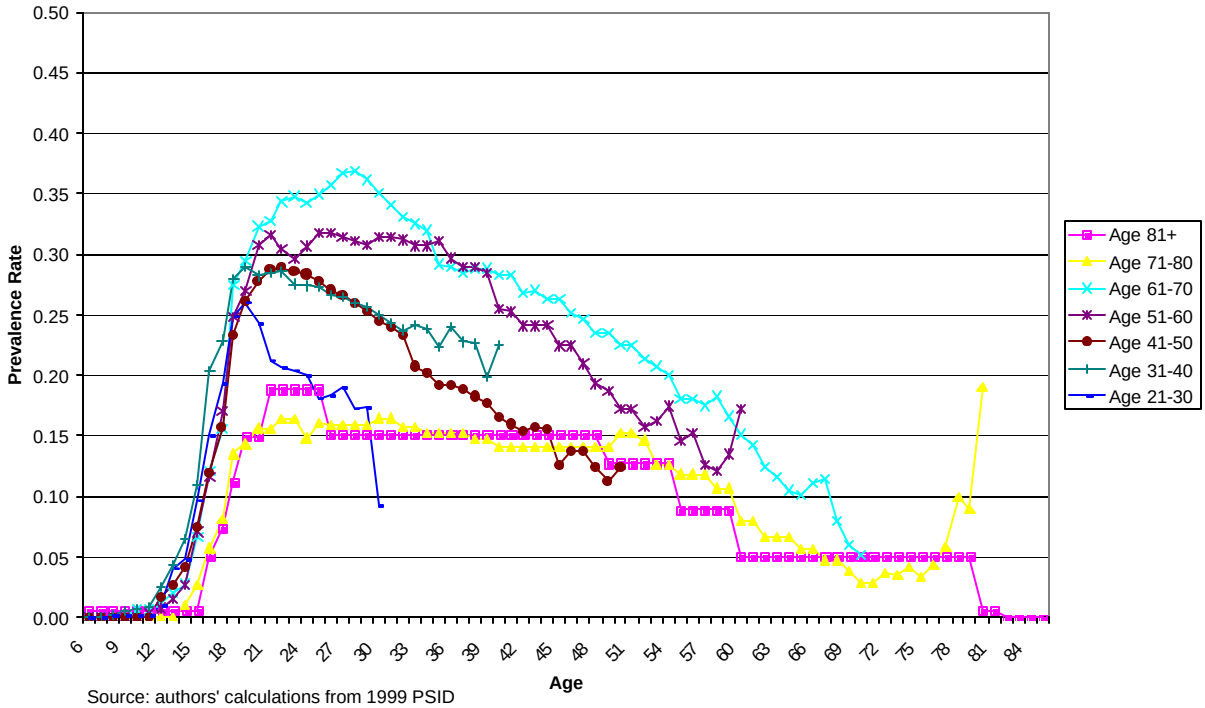
Source: authors' calculations from Waves A-I of BHPS

Figure 7C
Life-Course Smoking Patterns of Russian Women, by Cohort



Source: authors' calucations from Round 9 of RLMS

Figure 7D
Life-Course Smoking Patterns of United States Women, by Cohort



Source: authors' calculations from 1999 PSID