THE ECONOMICS OF SMOKING IN RUSSIA: PRICES AND CONSUMPTION

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Smoking is a major cause of premature mortality in Russia.

In 2013 the government has introduced a restrictive anti-smoking law, including significant tax increases.

However, not much is known about the responsiveness of Russian smokers to price changes.

Overview

1. Background

2. Empirical strategy and descriptive evidence on smoking from RLMS

3. Preliminary results on price responsiveness of cigarette demand in Russia

Decreases in alcohol-related causes of death would lead to substantial improvements, but not close the gap.

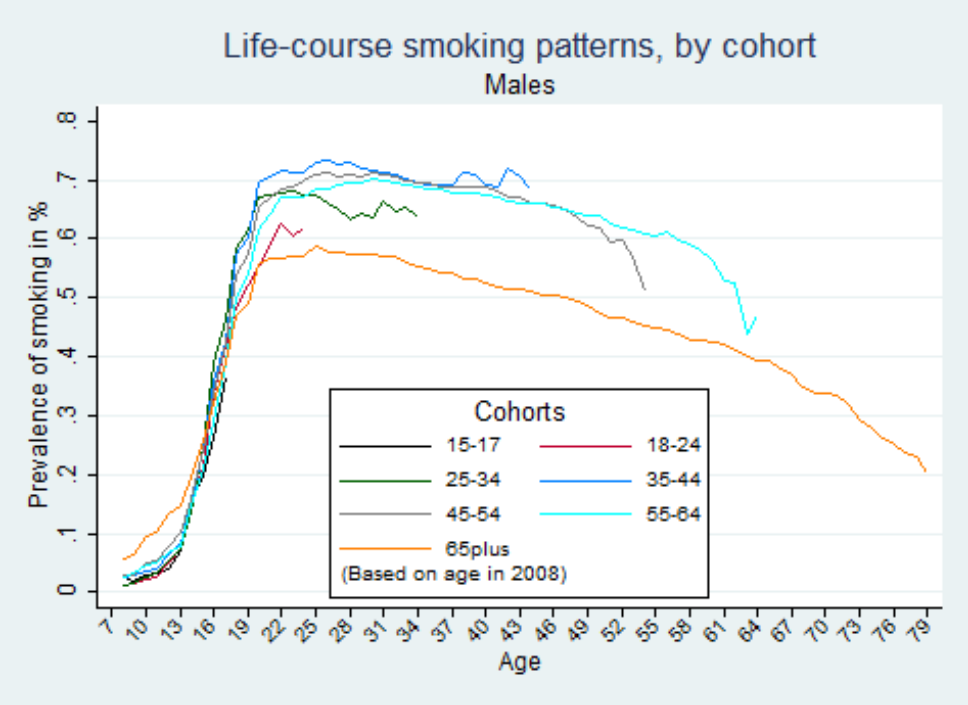
Life expectancy at birth (2010)

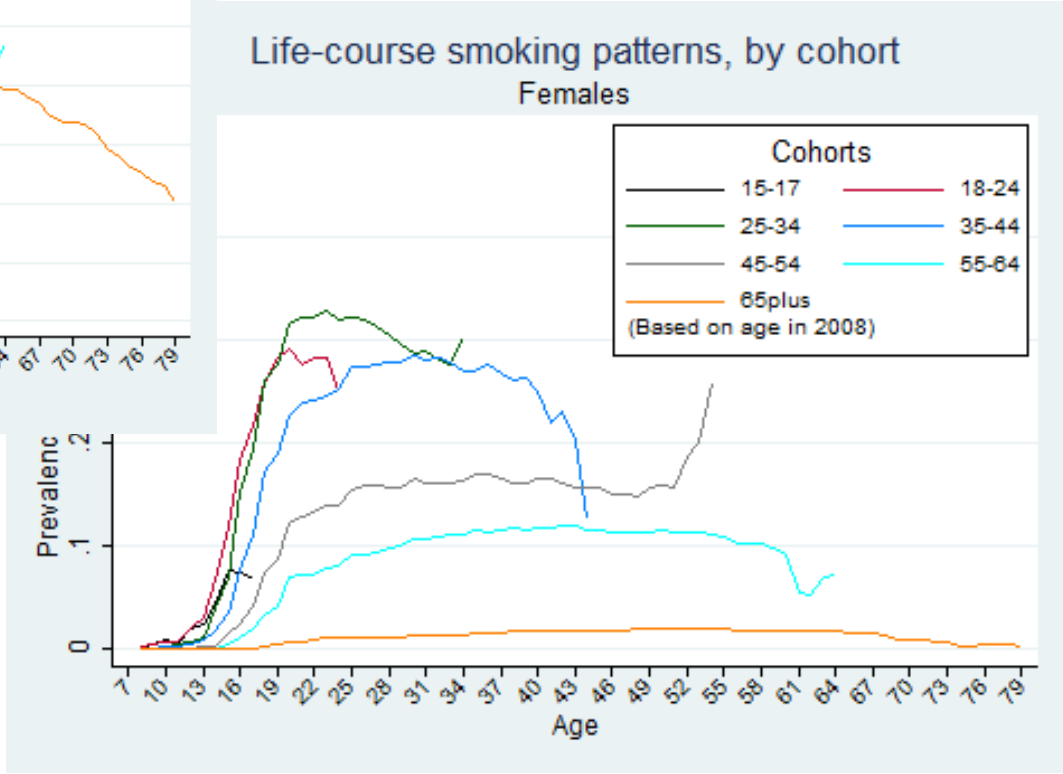
Country		Men	Women	
Russia		63	74.7	
Russia (1987)	+6.7	69.7	78.2	+3.5
UK		78	81.8	

Life expectancy in 2010 based on projections of lowest level ever recorded in Russia for a number of alcohol-related causes of death (year 1987)

Source: Shkolnikov et al. (2013)

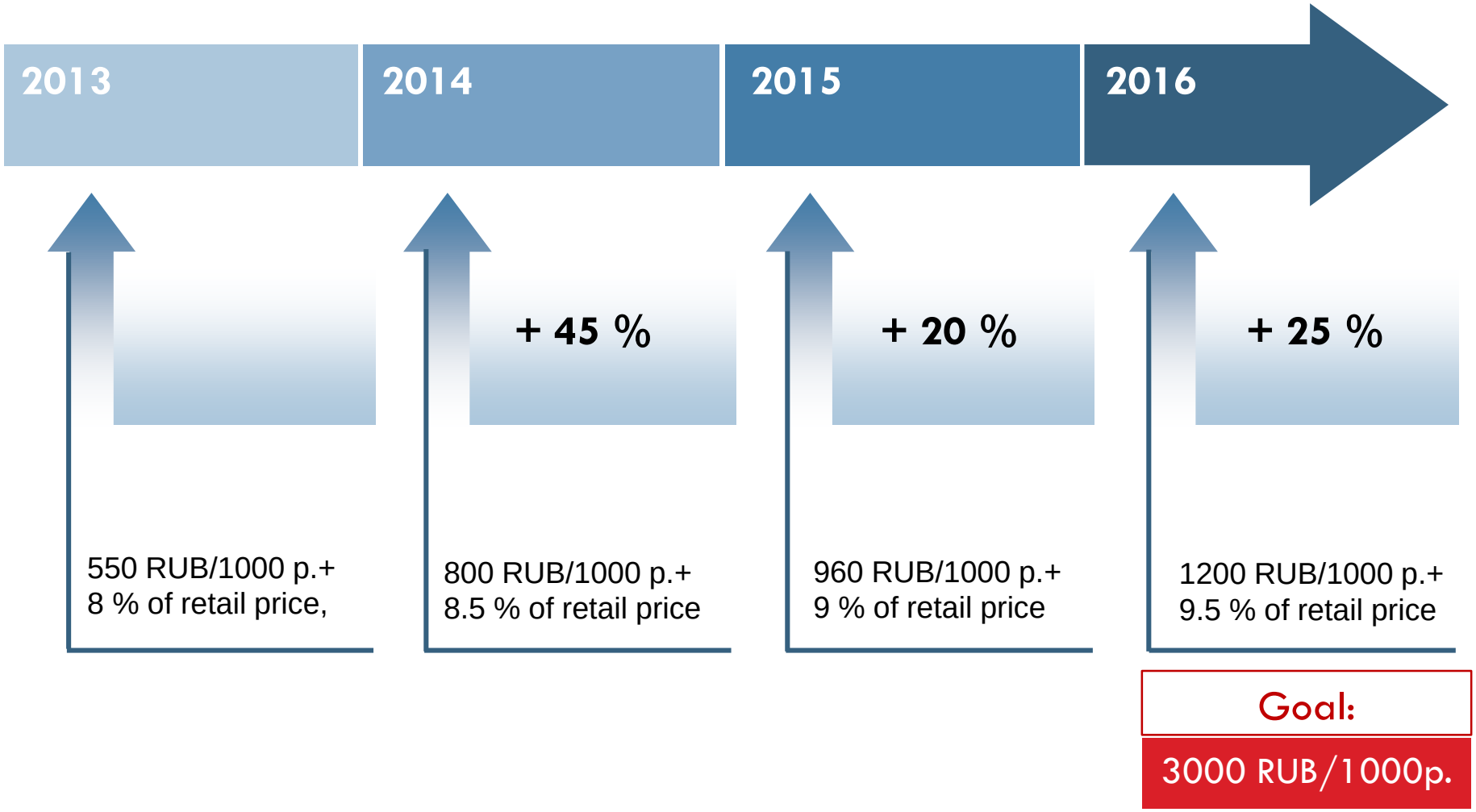
Smoking is the 'norm' among men, and since the 1980s increasingly observed among women.



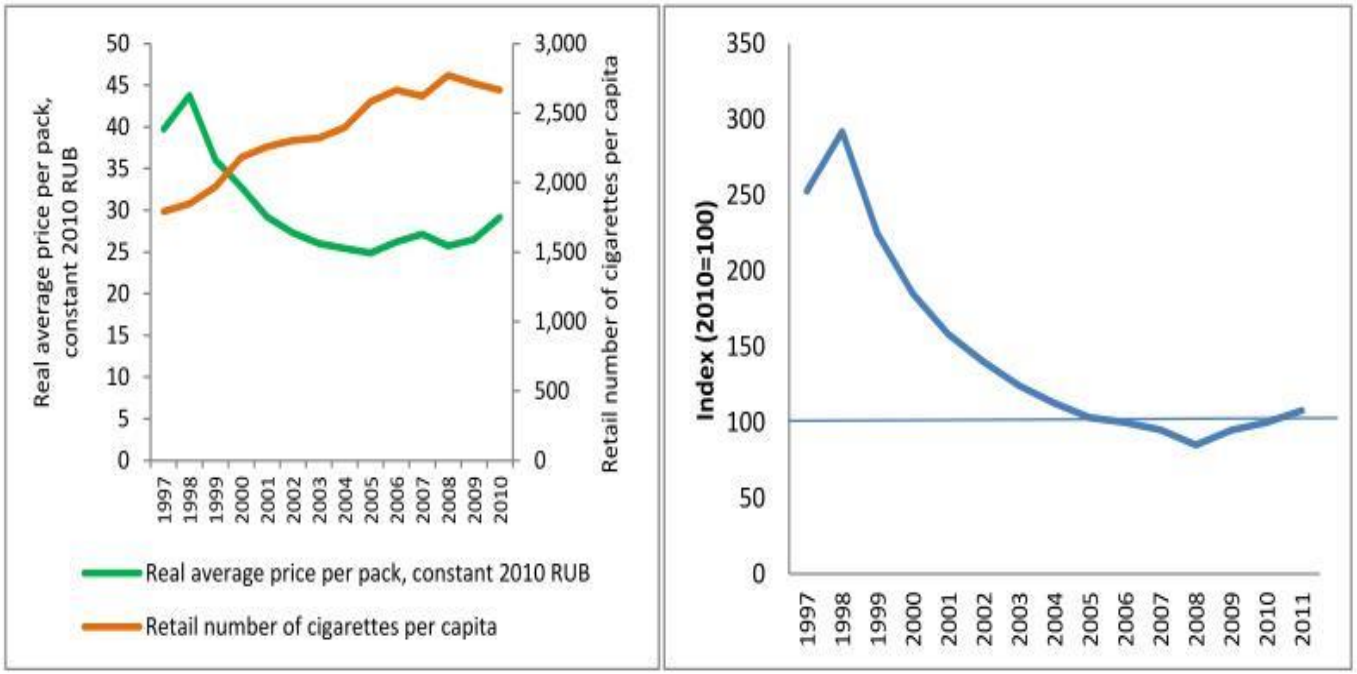


Source: Own calculations based on RLMS 2001-2010

The anti-smoking law foresees gradual excise tax increases to adjust prices to the price level in WHO European region.



These increases are particularly important since cigarettes had become more affordable between1998 and 2008.



Source: WHO calculations based on Euromonitor International Ltd 2012, IMF World Economic Outlook and World Bank data.

* Affordability index: Average real cost of buying 100 packs of cigarettes divided by real per capita GDP

So: a number of changes to come, but a sparse literature on the price responsiveness of smoking in Russia.

		Participation		Intensity	
Study	Data	Men	Women	Men	Women
Ogloblin & Brock (2003)	RLMS 7 & 8	-0.085	-0.628	-	-
Lance et al. (2004)	RLMS 7, 8, 9	-0.05	-	0	

- International literature on price responsiveness
  - Responsiveness between -.3 and -.5 (Chaloupka & Warner 2000)
  - Gallet & List (2003) meta-analysis of 86 published studies
    - Mean price elasticity -.48 (SD .43, range -3.12 - 1.41)
    - Price elasticity larger for adolescents and young adults
    - Demand specification and estimation strategy influence reported price elasticities

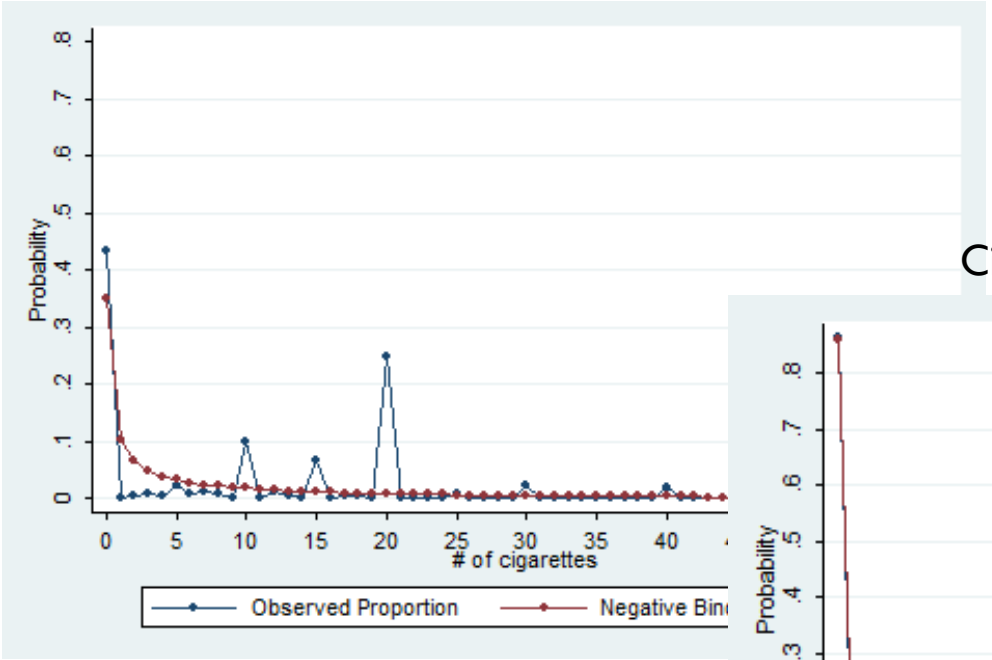
When seeking to model cigarette demand we need to tackle a number of theoretical and empirical issues.

- Theoretical issues with modelling cigarette demand
  - How do the addictive properties of nicotine affect consumption behaviour?
    - How to incorporate habit formation into demand models?
    - Are smokers rational, forward-looking agents?

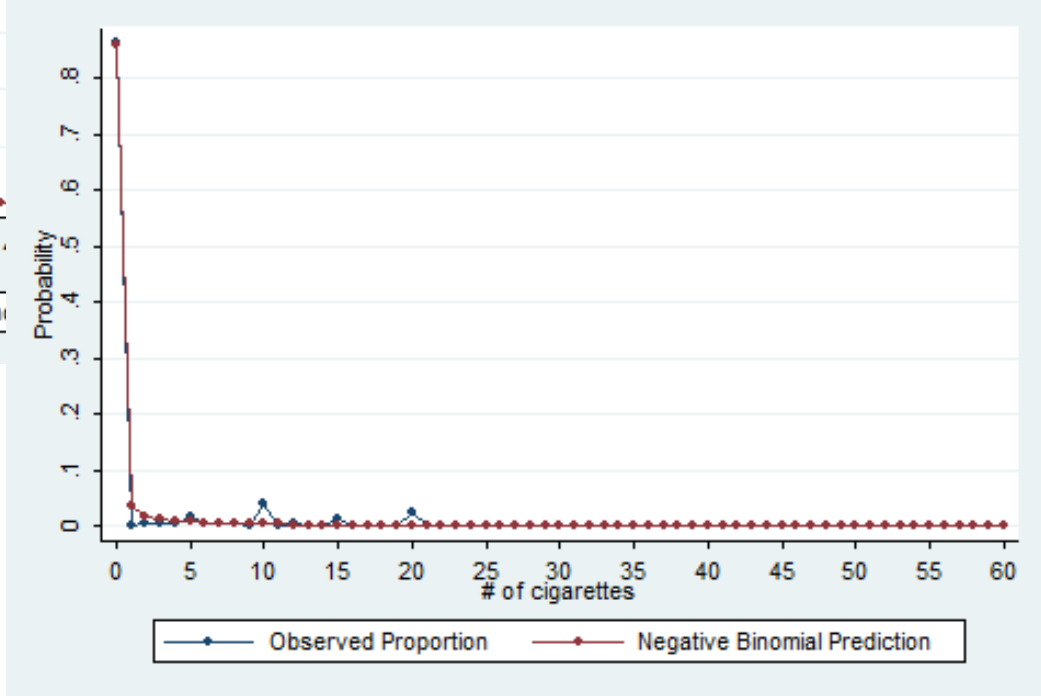
- Empirical issues with estimating cigarette demand
  - Count data
  - Problem of excess zeros
    - Two types of zero-generating processes
  - Heaping in the dependent variable

Our dependent variable is characterised by a large number of zeroes and heaping at multiples of 5.

Cigarette consumption - males

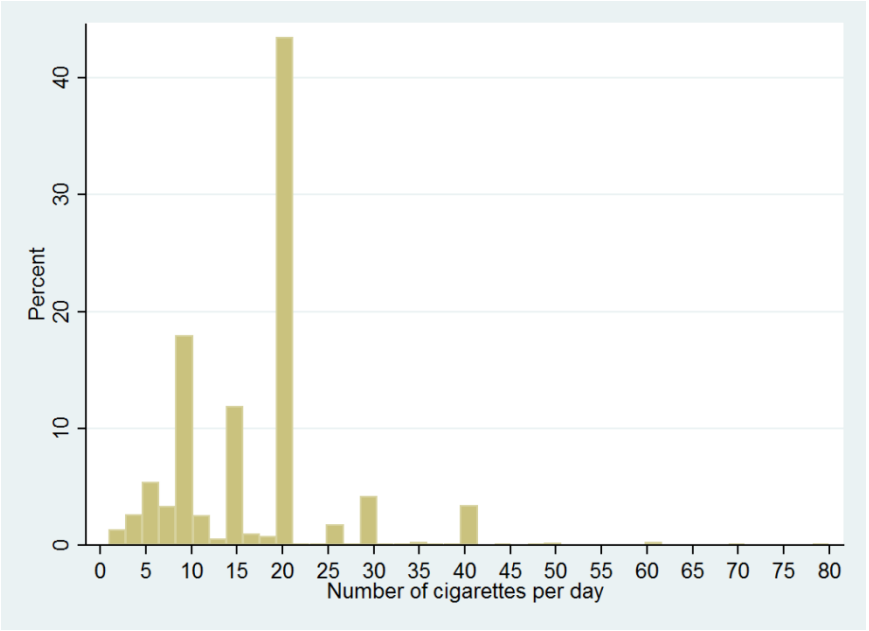


Cigarette consumption - females

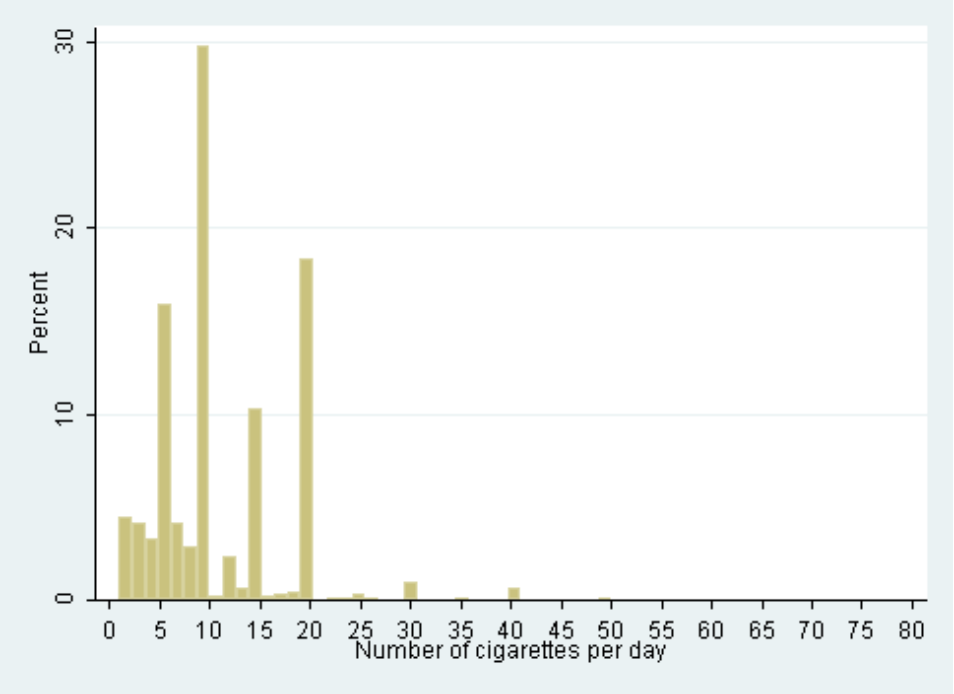


The default reporting mode of cigarette consumption is in multiples of 5.

Males



Females



The key question is whether the heaped values reflect true consumption patterns or reporting error.

True consumption behaviour

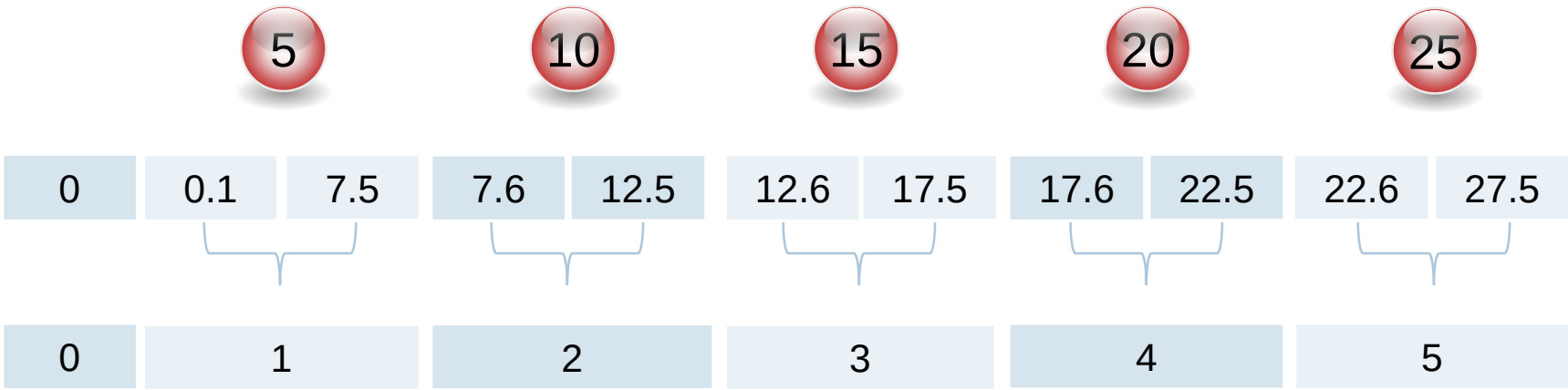
Individuals regulate their consumption according to pack sizes.

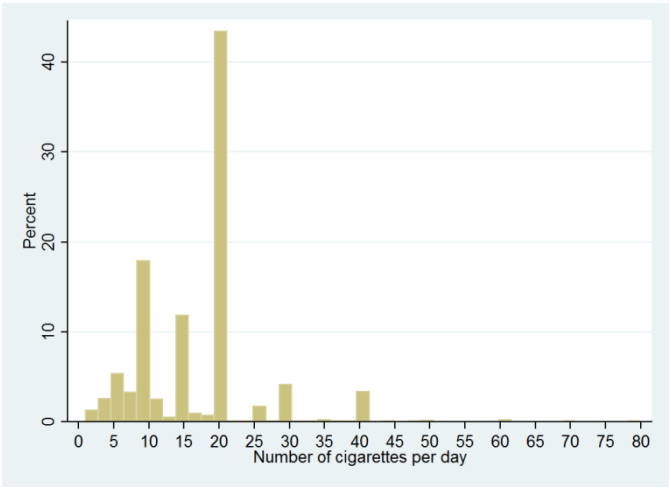
Reporting error

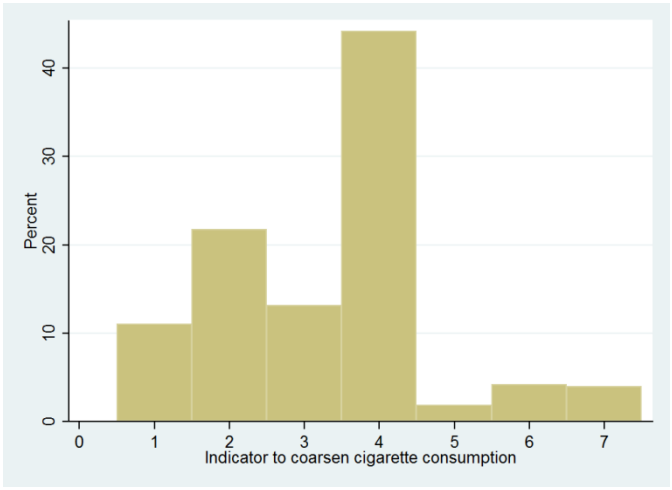
Individuals use information about their general smoking habits rather than recalling exact counts.

Measurement error will lead to biased and inconsistent estimates

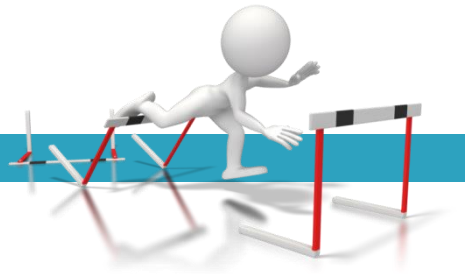
To account for heaping we create a categorical indicator to coarsen the observations around the heaping points.







The observed count consists of two components: participation and consumption.



Observed consumption (Y)

split into

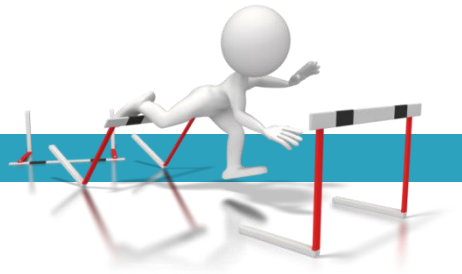
	Participation	Consumption	
Utility variables	Y_1^{**}	Y_2^{**}	$F(y_1^{**}, y_2^{**})$
Hurdle variables	Y_1^{*}	Y_2^{*}	
Hurdle conditions	$Y_1^{*} = 1\{Y_1^{**} > 0\}$	$Y_2^{*} = 1\{Y_2^{**} > 0\}Y_2^{**}$	$Y = Y_1^{*}, Y_2^{*}$
Specification for F	Bernoulli	Zero-inflated	
Source of 0	$Y_1^{*} = 0\{Y_1^{**} \leq 0\}$ ↓ non-smokers		

First-hurdle dominance:

$\Pr(Y > 0 | Y_1^{**} = 1) = 1$

$\Pr(Y_1^{**} > 0, Y_2^{**} \leq 0) = 0$

A key issue in specifying the DHM relates to the issue of dependence between the error terms.



Dependent errors
Sample selection model

$$\Pi_0[1 - p(Y_1^* = 1)]\ \Pi_+\ p(Y_1^* = 1)g(y|Y_1^* = 1)$$

Logit/Probit

Ordered probit with sample selection

Independent errors
Two part model

$$\Pi_0[1 - p(Y_1^* = 1)]\ \Pi_+\ p(Y_1^* = 1)g(y)$$

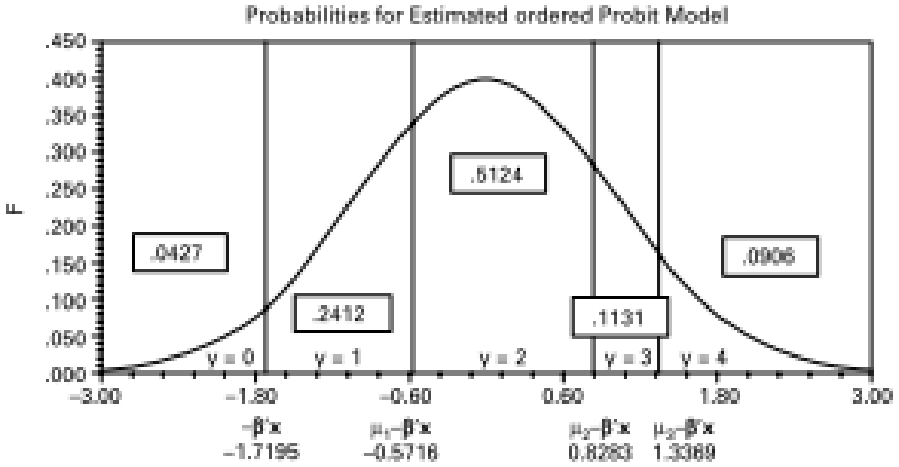
Logit/Probit

Ordered probit on positive observations

A note on identification in the ordered probit model:

The grouped cigarette consumption can be viewed as censoring the true cigarette consumption according to the following mapping:

$$
\begin{aligned}
Y = 1 \quad & if \quad -\infty < Y^* \leq \mu_1 \\
Y = 2 \quad & if \quad \mu_1 < Y^* \leq \mu_2 \\
Y = 3 \quad & if \quad \mu_2 < Y^* \leq \mu_3 \\
Y = 4 \quad & if \quad \mu_3 < Y^* \leq \mu_4 \\
Y = 5 \quad & if \quad \mu_4 < Y^* \leq \mu_5 \\
Y = 6 \quad & if \quad \mu_5 < Y^* \leq \mu_6 \\
Y = 7 \quad & if \quad \mu_6 < Y^* \leq +\infty
\end{aligned}
$$



Usually: thresholds are unknown → identification requires additional restriction

Here: thresholds are deliberately set → can pin down location of thresholds and calculate variance

The Data come from the Russia Longitudinal Monitoring Survey (RLMS-HSE).

- A series of nationally representative household surveys (repeated cross-sections)
  - collecting data on a range of socioeconomic, demographic, health status as well as behavioural and attitudinal indicators
  - for approximately 10,000 individuals
  - in 38 regions of Russia
  - cross-sectional and longitudinal element (unbalanced panel)

- Total sample: 87,022 observations (41,781 men & 45241 women)

The Data: Smoking prevalence between 2001 and 2010 in RLMS.

	2001		2004		2007		2010	
	Men	Women	Men	Women	Men	Women	Men	Women
Smokers (%)	60.2	13.8	58.3	14.6	58.2	15.3	53.8	14.8
Current age	40.8	35.9	40.9	36.1	41.5	37.1	41.6	37.7
Age started	16.8	19.9	16.6	19.4	16.5	19.3	16.6	19.4
N°cigarettes/day	16	10	17	12	17	11	17	12
Per capita income	7,827	7,673	10,383	11,233	13,577	14,577	16,573	16,474
Observations	3,268	4,523	3,244	4,423	3,756	5,196	5,952	8,198

The Data: Profile of a 'typical' smoker reveals considerable differences by gender.

	Men		Women	
	Smoker	Non-smoker	Smoker	Non-smoker
Age	44.3	40.9	36.8	48.9
University degree	12%	22%	16%	20%
Manual occupation	37%	21%	11%	23%
Managerial & prof.	13%	18%	25%	24%
Single	23%	31%	22%	19%
Real hh income	12,786.87	14,241.44	13,493.29	11.604.49
Moscow & SPB	11%	12%	23%	11%
Top quartile alcohol	32%	26%	32%	26%

Our empirical specification is a hurdle model with first hurdle dominance and independent error terms.

$$\Pi_0[1 - p(Y_1^* = 1)]\ \Pi_+\ p(Y_1^* = 1)g(y\ )$$
$$= \Pi_0\ [1 - p(v > -\alpha' Z)]\ \Pi_+\ p(v > \alpha' Z)g(y)$$

Logit/Probit — Ordered probit

- Estimated separately for men and women
- Main independent variables of interest: price and income
- Controls for age, education, occupation, household size, marital status, living in big city, region, year of the survey, perceptions of control
- Complementarities with alcohol consumption

Preliminary results for participation and consumption from the hurdle model.

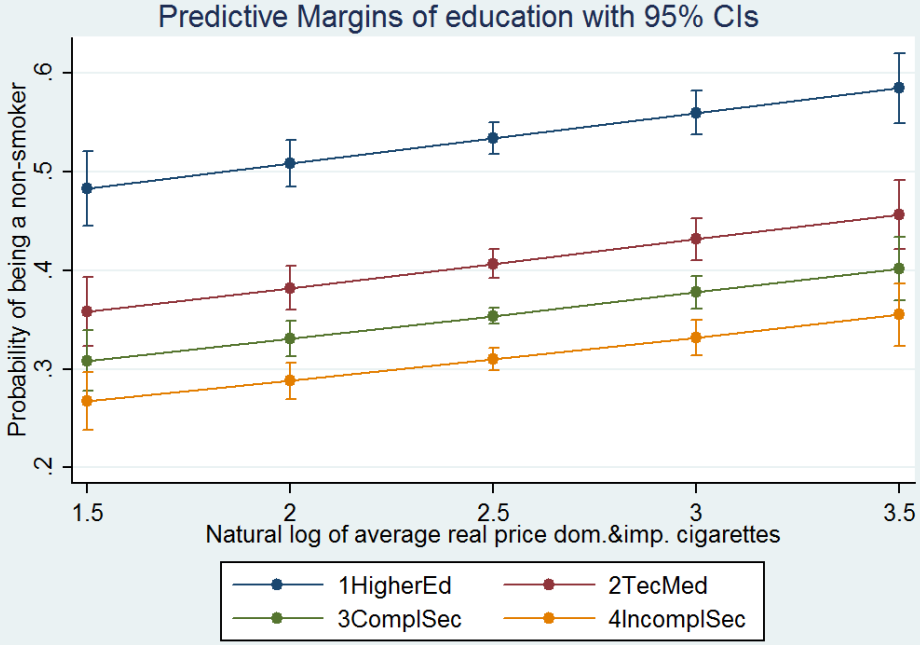
Likelihood of being a **non-smoker**

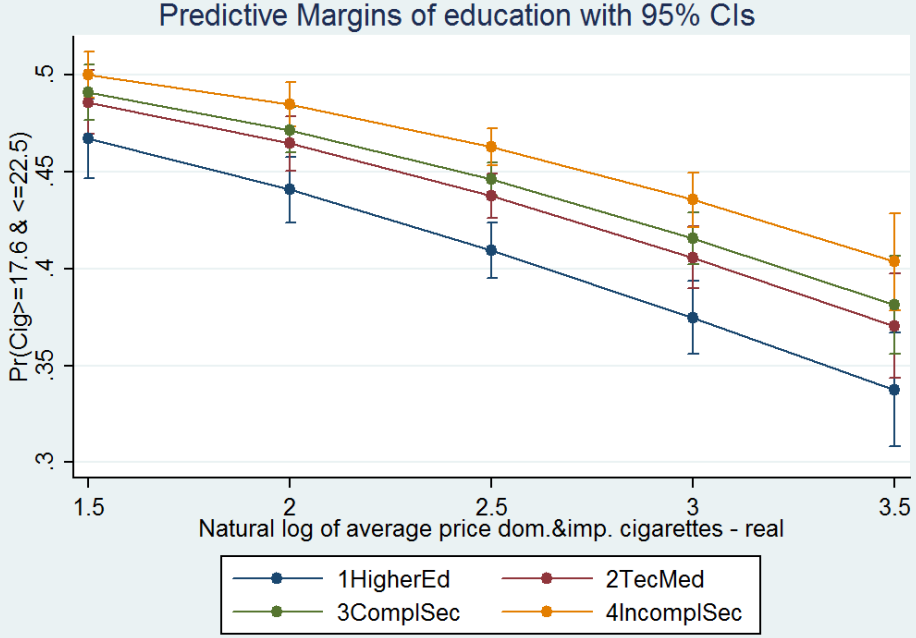
	Men		Women	
	Participation	Consumption	Participation	Consumption
Age	0.80***	0.04***	0.73***	0.01
Real avg. price (ln)	1.26**	-0.26***	1.69***	-0.35***
Per capita income (ln)	0.95***	0.04***	0.88***	0.03**
University degree	2.84***	-0.08***	3.02***	-0.07***
Tec & Med	1.60***	-0.04***	1.82***	--0.03***
Top quartile alcohol	0.74***	-0.04***	0.53***	0.09**
City > 500k	1.03	0.01	0.58***	0.03
Power rank	1.09***	-0.05***	1.07***	-0.04**
Smokes> 10 years	-	0.12***	-	0.17***
Observations	27,197	16,542	28,666	5,129

Very preliminary Results – participation.

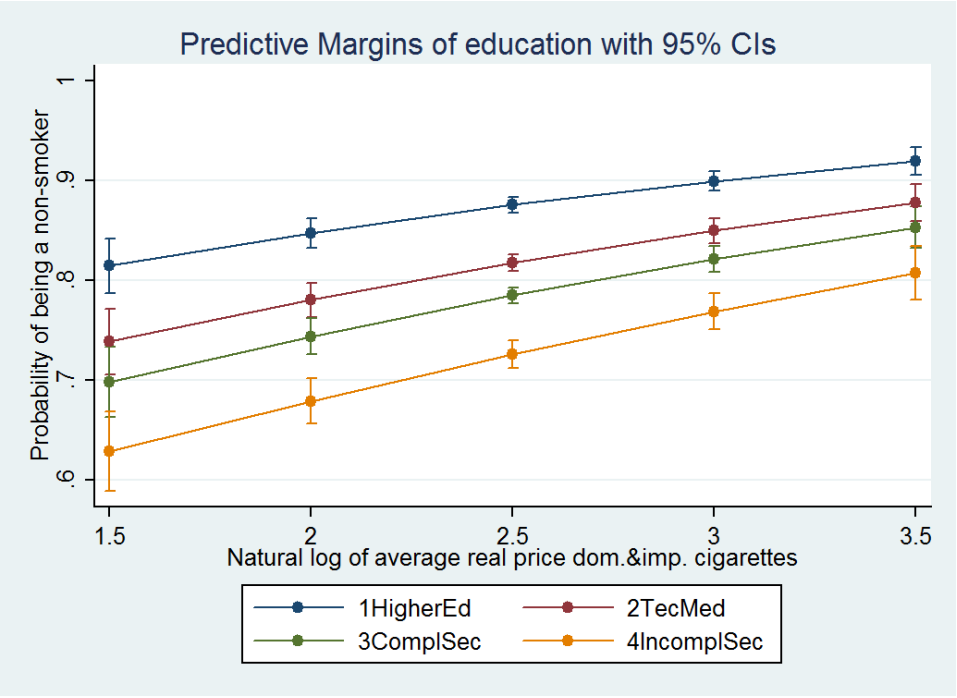
- Smoking increases with income, age, location in Moscow/St. Petersburg, and alcohol use
- Smoking decreases with price, being single, education, and 'power'
- Females more sensitive to price than males
- Male smoking more closely linked to the labour market (e.g. manual and unskilled occupations)
- Females more likely to smoke in larger cities

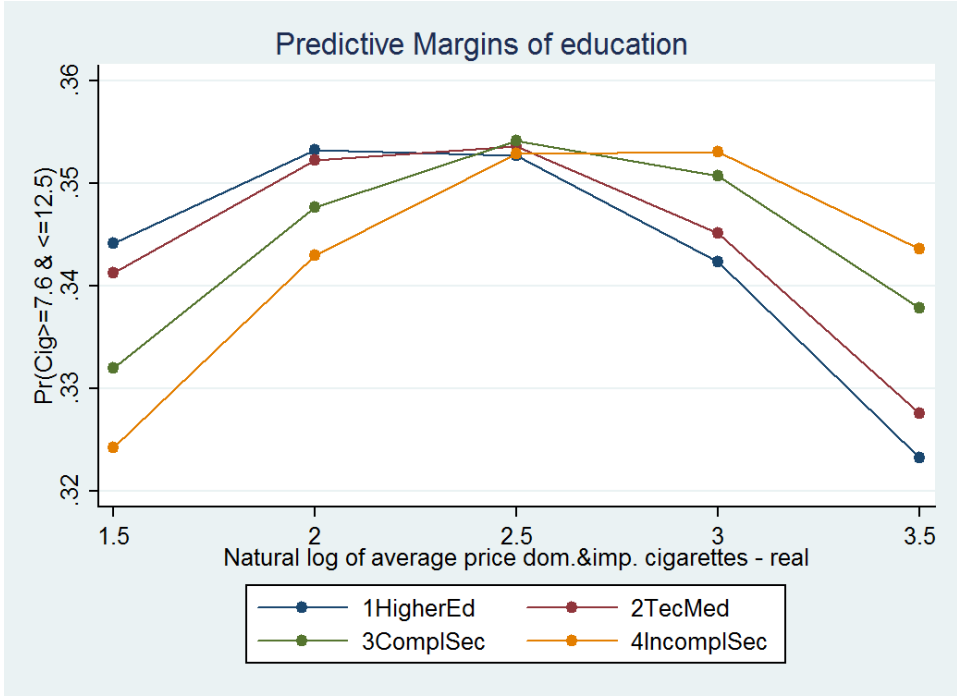
The influence of education at different levels of price on the probability of men smoking 20 cigarettes.





For women, price responsiveness of participation increases with education, but is more ambiguous for consumption.





Conclusions & policy implications

- Participation results consistent with wider empirical and theoretical literature
  - e.g. Education, income, age have expected effects
- But contrary to earlier work on Russia, we find that smoking participation ***is*** responsive to price
  - The effect is stronger for women
  - As too is the impact of income

Conclusions & policy implications

- Consumption results consistent with wider empirical and theoretical literature
  - e.g. Education, income, age have expected effects
- We find that consumption ***is*** responsive to price
  - Different stories for male and female
  - Female consumption appears to be more complex
    - e.g. dynamics; non-linearity; interactions……
- Habit formation (persistence) : duration very important
  - Therefore look at dynamics