The Retirement Consumption Puzzle: Evidence from Urban Russia

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In this paper we investigate the size of the consumption drop in Russia. We use micro data on the household consumption of food and non-durables collected during the survey of household welfare and participation in social programs (NOBUS). We use the regression discontinuity design, and impose an identifying assumption that consumption would be the same around the threshold of pension eligibility if individuals did not retire. In our data a significant fraction of individuals stop working after reaching retirement age. We estimate that a 20.6 percent drop in consumption is associated with retirement induced by eligibility. We show that the fall in consumption is offset by labor supply decisions and government subsidies. We also present evidence that households adapt rapidly to changing economic situations.

Non-technical summary

During the period 1999 – 2008 Russian private consumption almost doubled and accounted on average for over 50 percent of GDP. The growth of private consumption was accompanied by rapid population ageing. From 1975 to 2007 the share of individuals above retirement age increased from 16 percent to 29.8 percent. Russia's population, already relatively old, is expected to continue to age, so that by 2025 one in five people in Russia will be over the age of 65.

In this report we investigate the impact of retirement on household consumption. Taking into account the growing number of pensioners and the increasing importance of private consumption, we contribute to an important topic in the analysis of aggregate economic fluctuations and draw important conclusions for government policies concerning this economically vulnerable group of the population.

According to the life-cycle model of consumption, people aim to smooth consumption over their life cycle. Thus we should not expect abrupt changes in consumption upon retirement. Empirical papers looking into the consumption patterns of older people in the US and Europe often find that there is a one-off drop in consumption at the time of retirement – the retirement consumption puzzle.

To study the consumption drop of Russian households we use data on food and non-durable consumption available from the survey of household welfare and participation in social programs (henceforth NOBUS). The survey was developed with the technical assistance of the World Bank and was administered by the State Statistics Service in the 2nd quarter of 2003.

To identify the effect of retirement on consumption we compare the consumption of households whose heads are marginally above or below retirement age. Inference made on the sample of individuals marginally above or below retirement age is known to be as good as a randomized experiment. Such individuals should have similar characteristics apart from their retirement status.

Our findings suggest that consumption declines as a result of retirement induced by eligibility. We estimate that retirement is associated with a 13.8 percent fall in consumption. The reduction in the consumption of food is larger than that in the consumption of non-durables. Our results are in line with previous findings for the US and Europe.

We find that the labor supply of pensioners is an important mechanism to smooth consumption at retirement. Almost half of the people who receive a pension continue to work. Our results suggest that individuals who stop working when reaching retirement age experience a larger drop in consumption – at 20.6 percent.

From the policy perspective, the current system of awarding pensions at an early age whether or not the recipient leaves the labor force ignores the fact that a significant proportion of older people is able and willing to work longer and to earn a living from employment. It may thus be desirable to raise the minimum retirement age.

Our dataset allows us to separate the impact of government in-kind transfers on consumption. We find that the consumption of non-durables, net of government transfers for housing, transport and medical expenses declines by 22.3 percent. Thus, government in-kind transfers prove to be valuable for pensioner households.

The reform of the social safety net changed the targeting of the most vulnerable groups and transformed most of the benefits into monetary form. We expect that the improved targeting and the monetization of government transfers should provide better possibilities for pensioners to smooth consumption.

Our results should not be taken as evidence against the life-optimizing behavior of households in Russia. Nevertheless, the dataset lacks some important information on household wealth. Insufficient resources accumulated by households prior to retirement may be responsible for the consumption drop. Moreover, the size of the dataset does not allow us to conduct a detailed analysis of the fall in consumption for more narrowly defined groups of people. Finally, we also found that the fall in consumption is mirrored by the fall in the subjective perception of sufficient resources needed for a household to live satisfactorily.

1. Introduction

Russian private consumption accounts, on average, for 50 percent of GDP.[1] In the structure of private consumption, the consumption of goods and services accounts for 81.2 percent of total consumption, government transfers account for 14.5 percent, and 4.3 percent of consumption is due to goods and services received in kind.[2] Private consumption declined before the onset of the economic upheaval at the beginning of the 2000s. In total, private consumption almost doubled during the period 1999 – 2008. The expansion of private consumption was accompanied by rapid population ageing. From 1975 to 2007 the share of individuals above retirement age increased from 16 percent to 29.8 percent. Moreover, the number of individuals above the age of 85 doubled. Russia's population, already relatively old, is expected to continue to age, so that by 2025 one person in every five will be over the age of 65 (Chawla et al., 2007). Despite a period of impressive economic growth (1999 - 2007), pensioners' standards of living remain relatively low. The average income replacement rate of pensions did not exceed 28 percent during the 2000s (State Statistics Service, 2009).

The aim of this paper is to investigate the impact of retirement on household consumption. Taking into account the growing number of pensioners and the increasing importance of private consumption, we contribute to an important topic in the analysis of aggregate economic fluctuations and the economic policy debate.

The theoretical models developed first by Modigliani and Brumberg (1954) and Friedman (1957) are the basis for analyzing household consumption choices over the life cycle. According to the life-cycle model of consumption, forward-looking agents smooth

[1] State Statistics Service (2009): Russia in figures 2009. Moscow, Goskomstat Rossii, p.112.
[2] State Statistics Service (2009): Russia in figures 2009. Moscow, Goskomstat Rossii, p.117.

their marginal utility of consumption across predictable income changes such as retirement.

Consider a simple model, following Modigliani and Brumberg (1954), where the decision problem of the representative agent is to maximize lifetime utility subject to the total resources available to him/her over the life cycle. The consumer derives utility from his/her own aggregate consumption in current and future periods.

The lifetime resources available to an agent consist of current income, assets owned and discounted non-property income which an agent expects to earn before he/she retires. It follows that the individual budget constraint can be written in the following form

$$\sum_{i=0}^{T-t} \frac{c_{t+i}}{(1+r)^{t+i}} = A_t + y_t + \sum_{i=1}^{T-t} \frac{y_{t+i}}{(1+r)^{t+i}} \qquad \textbf{(1)}$$

where c_t denotes consumption in the period t, y_t non-property income, and A_t are assets. The interest rate r is assumed to be constant.

Under further assumptions that preferences are homothetic and that consumers do not inherit or leave bequests, Modigliani and Brumberg (1954) conclude that a representative agent plans to consume a constant fraction of his lifetime resources in every period. That is, regardless of changes in income, the consumer aims to keep the time path of consumption smooth. The model was further extended to incorporate factors such as uncertainty, leisure and a bequest motive (e.g. Deaton, 1992; Browning and Lusardi, 1996), yet the main results remained the same: people aim to smooth consumption over their life cycle.

Empirical papers looking into the consumption patterns of older people often find that there is a one-off drop in consumption at the time of retirement – the retirement

consumption puzzle. One of the first empirical papers to look at the changes in consumption on retirement is Hamermesh (1984). He found that American consumers experience a sharp fall in expenditure in the first years after retirement. More recent studies for the US report a decrease in consumption expenditures of at least 5 percent (see Aguiar and Hurst, 2007; Fisher et al., 2008). However the consumption drop varies across different consumption categories. Aguiar and Hurst (2007) report that spending on total food consumption falls by 7 percent while spending on clothing and transport fall by 18 and 15 percent respectively. At the same time expenditures on entertainment and housing increased. Thus, food and work-related expenditures are the main factors in explaining the consumption drop at retirement. Evidence on the differential expenditure decline is not limited to the US. Banks et al. (1998) report a similar consumption pattern of retired households in Britain. Miniaci et al. (2010) and Battistin et al. (2009) provide similar evidence for Italy. The consumption drop at retirement is also documented for Germany (e.g. Schwerdt, 2005 and Lührmann, 2010).

Declining work-related expenditures may be consistent with the standard life-cycle model. However, the observed decrease in food spending casts considerable doubt on the propensity of households to smooth consumption upon retirement. Given that food is a life necessity and thus has a low income elasticity, the inability to smooth food consumption is likely to indicate that retired households will not be able to smooth other items in the consumption bundle.

A considerable number of studies have concentrated on the consumption smoothing abilities of Russian households in response to transitory income shocks such as the economic crisis of 1998. Recent evidence for Russia (e.g. Skoufias, 2003) indicates that

Russian households were able to implement self-insurance strategies such as increasing their labor supply, borrowing and selling assets in response to income shocks. Gerry and Li (2008) analyze household smoothing abilities in Russia and find that that the labor market is an important mechanism allowing households to smooth their consumption but also exposing them to risk, mainly through job loss. The role of government transfers is examined by Lokshin and Yemtsov (2004). They conclude that the system of a formal social safety net was not able to protect Russian households from a transitory income shock in 1998. Finally, Stillman and Thomas (2008) found that household nutrient intake remained constant despite falling expenditures in 1998.

In this paper, to study the consumption drop of Russian households we use data on food and non-durable consumption available from the survey of household welfare and participation in social programs (henceforth NOBUS). This survey was developed with the technical assistance of the World Bank and was administered by the State Statistics Service in the 2nd quarter of 2003.

To identify the effect of retirement on consumption, we rely on the exogenous variability in pension eligibility in the framework of a regression discontinuity design (see Hahn et al., 2001). This identification strategy with application to the retirement consumption puzzle was recently proposed by Battistin et al. (2009). The authors evaluate the change in consumption caused by retirement by exploiting pension eligibility to correct for the endogenous nature of the retirement decision. At the heart of their identification strategy is a standard assumption made in the program evaluation literature that consumption would remain smooth around the threshold of pension eligibility if no one retired (e.g. Imbens and Lemieux, 2008; Lee and Lemieux, 2010).

Our results contribute to the literature by providing the first assessment of the size of the fall in consumption associated with retirement in Russia. In contrast to the previous literature we look at the response of Russian households to the permanent income shock induced by retirement. In addition, presenting first estimates of the consumption drop due to retirement we review household consumption smoothing strategies. We further contribute to the literature by presenting first evidence on the degree to which households adapt to changing economic circumstances.

The results suggest that a significant fraction of individuals retire as soon as they become eligible to receive a pension. We show that consumption declines by 20.6 percent in response to retirement induced by eligibility. Regarding household consumption smoothing strategies, we find that roughly half of pension recipients continue to work. Labor supply is thus an important mechanism of consumption smoothing. From the policy standpoint we find that government transfers played an important role in consumption smoothing with regard to non-durable goods. We further find that individual perception of sufficient resources significantly declines in response to retirement induced by eligibility.

The remainder of this paper is organized as follows. Section 2 describes the Russian pension system. Section 3 describes the data on and definitions of eligibility and retirement. Section 4 presents an identification strategy to deal with the endogenous choice of retirement as proposed by Battistin et al. (2009). Section 5 presents empirical results. We draw conclusions in Section 6.

2. The pension system in Russia

Russia's public pension insurance system was designed in the 1950s and 1960s and was the only source of retirement income in the former USSR. Following the collapse of the Soviet Union, the Russian Federation adopted its own mandatory and almost uniform system of public pension insurance. The system covers both state and private workers as well as self-employed people working in both urban and rural areas. In addition to work-related pensions, social pensions and private pensions were introduced.

Individuals may claim the unreduced pension after accumulating 25 (20) years of service and reaching the legal retirement age of 60 for males and 55 for females. The income replacement rate is set at 55 percent of the average salary in the last two years of employment or any best 5 years of service.[3] The Russian pension code contains special provisions for various groups of workers. Individuals employed in the Far North and/or working in hazardous conditions are entitled to early unreduced pensions. Sinyavskaya (2005) reports that in 2003 nearly 24 percent of new pension claims were based on special provisions.

Russian legislation has no provision restricting the right of pensioners to work. In fact Maleeva and Sinjavskaja (2007) and Nivorozhkina (2007), find that the vast majority of pensioners continue working while receiving a pension, most of them with the same employer. Moreover, younger cohorts indicate greater willingness to continue working after reaching retirement age. In this respect the Russian pension system may be viewed as a provider of a supplementary income for older households.

[3] At the same time there is an upper cap on pensions. According to federal legislation the maximum pension may not exceed 3 minimum pensions. For every additional year of contribution the upper cap on pensions may rise by 1 percent but may not exceed a total of 20 percent.

3. Data

We use information on consumption and pension status obtained from the NOBUS survey.[4] The survey also provides information on a range of demographic, education, employment and income variables. The survey was developed with the technical assistance of the World Bank and was administered by the Federal State Statistics Service (Rosstat) in the 2nd quarter of 2003. The survey uses a random sample of 44,529 households and 117,209 people. Such a sample size makes it possible to obtain representative data both at national and regional level for 47 out of 89 states of the Russian Federation, where approximately 72 percent of the total population live (see Ovtcharova and Tesluk, 2008). The survey corresponds well to the official statistics on demographics and incomes provided by Rosstat.

3.1. Information on consumption

The information on food consumption collected with the NOBUS survey is comprehensive and includes purchased food, including food consumed away from home; food that is home-produced; food received as a gift or remittances from other households as well as food received from an employer as payment in kind.[5] The estimated food consumption is adjusted to take regional price differences into account and includes the value of food produced at home or received as a gift (see Ovtcharova and Tesluk, 2008).[6]

Non-durable consumption is computed in a similar way to food consumption. For the purpose of our study we include in non-durable consumption the value of alcoholic beverages; health; housing, communication; recreation and culture and education

[4] NOBUS is a publicly available dataset and may be downloaded at http://go.worldbank.org/VWPUL3S9F0 .
[5] We would like to thank Lilia Ovtcharova and Emil Tesluk for sharing the code to compute consumption aggregates. The code is available at http://go.worldbank.org/VWPUL3S9F0 .
[6] To avoid taking into work related expenditures account we exclude the value of food consumed regularly outside the home.

expenditures. Non-durable consumption also includes the value of government subsidies received by Russian households for expenditures on housing, medical care and transport.[7]

3.2. Definition of retirement status and pension eligibility

We define individuals as being eligible to retire when they reach the statutory retirement age of 60 for males and 55 for females. To define the retirement status we use the respondent's self-reported status. An individual is defined as retired if he/she reports receiving a work-related old-age pension. As explained in Section 2, some groups of workers may receive an unreduced pension before reaching the statutory retirement age.

3.3. Definition of the working sample

In the estimation we take the head of the household to be the oldest male living in the household the urban area. We do not use the wife's retirement status to classify a household as retired or otherwise.[8] We exclude households situated in rural areas because of the problems associated with assigning monetary value to food produced at home and/or received in kind. We restrict the sample to households whose heads are either employed or retired and receiving a work-related pension. Finally, households with missing information on consumption are excluded from the analysis. Table 1 presents a detailed breakdown of the selection criteria adopted to derive the final sample used in the paper.

[7] In our estimation we use the household-adjusted OECD scale.

[8] The study of female consumption choices is more complicated since women reach retirement age earlier than men. As women's labor income is likely to be less important for the household than that of men and due to the fact that retired women are likely to contribute more to household production, we would not expect women's retirement to have a large impact on household consumption.

Table 1. Sample selection criteria

Description of sample selection procedure	Sample size
Raw data: total number of households	44,506
Step 1: Keep households situated in urban areas	31,399
Step 2: Keep households with male head aged 50 to 70	7,594
Step 3: Keep households whose heads are either employed or retired	6,625
Step 4: Keep households with no missing information on consumption	6,475

4. Identification strategy

Following the notation of the potential outcome approach to causal inference, let us define treatment as receiving an old-age pension, so that $W = 1$ if the head of the household is retired and $W = 0$ if the head of the household is not retired. Furthermore, let $Y(1)$ and $Y(0)$ be the consumption of the household if the head of the household is retired and not retired respectively. The causal effect of retirement on consumption is then defined as $\beta = Y(1) - Y(0)$.

The parameter β represents the change in consumption induced by a change in the retirement status of the household head. Ideally, in order to assess the role of retirement in determining the standard of living relative to the pre-retirement period we need to observe both outcomes $Y(1)$ and $Y(0)$ simultaneously. This is clearly impossible since both outcomes can not be observed for the same individual at the same time, thus β is an unobservable parameter.

The probability of becoming a pensioner changes discontinuously when an individual reaches retirement age. In this respect the decision to retire may correspond to

the regression discontinuity design (e.g. Trochim, 1984; Hahn et al., 2001; Lee and Card, 2008; Imbens and Lemieux, 2008). The idea underlying the regression discontinuity design is to compare individuals who are marginally above or below some known eligibility threshold (retirement age in our case) where the probability of being retired changes discontinuously. Such individuals should have similar characteristics except for retirement status. In other words, inference made on the basis of a sample of individuals marginally above and below some known threshold can be as good as a randomized experiment (Lee and Lemieux, 2010).[9]

In regression discontinuity design, treatment is determined based on a value of an observed "assignment" variable X (age in our case) exceeding a known cut-off (threshold) point c. The variable X may correlate with potential outcomes, but it is assumed to be smooth so any discontinuity in the conditional distribution of the outcome, indexed by the value of this covariate at the cut-off value, is interpreted as evidence of a causal effect of the treatment.

It is useful to distinguish between two designs, the sharp and the fuzzy regression discontinuity designs (e.g. Trochim, 1984, 2001; Hahn et al., 2001). In the sharp design, treatment W is a deterministic function of the assignment variable X, so that

$$W = 1 \quad X \geq c \quad .$$

All units with $X \geq c$ are automatically assigned to the treatment group, and all units $X < c$ are assigned to the control group (not receiving treatment). In the case of the sharp design the outcome is defined as a difference in the conditional expectations of the outcome on each side of the threshold,

[9] A consequence of a randomized experiment is that assignment to treatment is independent of the observed covariates.

$$\lim_{x \downarrow c} E\ Y \mid X = x\ - \lim_{x \uparrow c} E\ Y \mid X = x\ = \lim_{x \downarrow c} E\ Y(1) \mid X = x\ - \lim_{x \uparrow c} E\ Y(0) \mid X = x\ ,$$

and may be interpreted as the average causal effect of the treatment at the discontinuity:

$$\tau = E\ Y(1) - Y(0) \mid X = c\ .$$

In order to give the effect a causal interpretation we need to impose an assumption of smoothness.

Assumption 1 (Continuity of Conditional Regression Functions)

If $E\ Y(1) \mid X = x$ and $E\ Y(0) \mid X = x$ are continuous in x, then

$$\tau = \lim_{x \downarrow c} E\ Y \mid X = x\ - \lim_{x \uparrow c} E\ Y \mid X = x\ .$$

For the continuity assumption let us use the average outcome of those immediately below the cut-off (the control group) as a valid counterfactual for those immediately above the cut-off (the treatment group). Importantly, the assumption implies that all other baseline covariates influencing Y are smooth functions with respect to X. If one or more covariates changes discontinuously at the cut-off, then τ will be a biased estimator.

As was discussed in the previous section, being eligible for a pension does not necessarily imply that an individual actually receives a pension. Some individuals receiving an old-age pension have not reached retirement age and retire on the basis of special legal provisions. On the other hand retirement is not mandatory. As a result we may observe an increase in the probability of retirement when individuals cross the eligibility threshold which is less than one. This implies that the probability of retirement

changes discontinuously at the threshold of pension eligibility. In this respect the decision to retire fits the fuzzy regression discontinuity design.

In the fuzzy regression discontinuity design the probability of receiving treatment does not change from zero to one at the threshold. Instead smaller jumps may occur such that:

$$\lim_{x \downarrow c} \Pr(W = 1 \mid X = x) \neq \lim_{x \uparrow c} \Pr(W = 1 \mid X = x).$$

This may happen if the stimulus to participate in the program is not strong enough to make everyone who is eligible do so and/or some individuals not eligible to participate in the program may gain access to it. In this case we interpret the ratio between the jump in the regression of the outcome on the covariate and the jump in the regression of the treatment indicator on the covariate as an average causal effect of the treatment.

$$\tau_{FRD} = \frac{\lim_{x \downarrow c} E\ Y \mid X = x\ - lim_{x \uparrow c} E\ Y \mid X = x}{\lim_{x \downarrow c} E\ W \mid X = x\ - lim_{x \uparrow c} E\ W \mid X = x}.$$

In our context the causal effect of retirement on consumption can be estimated using two-stage least squares (TSLS) where the endogenous variable, pension receipt, is instrumented by the dummy variable – reaching retirement age.[10] For this instrument we specify the following regression of household consumption on the retirement status.

$$Y = \beta_0 + \beta_1 P + f(X - c) + \varepsilon \qquad \textbf{(1)}$$

$$P = \gamma_0 + \gamma_1 E + g(X - c) + \upsilon \qquad \textbf{(2)}$$

where P is a dummy variable that is equal to 1 if the individual receives pension and 0 otherwise. The decision to retire is instrumented by a dummy variable E that takes the

[10] See also Imbens and Angrist (1994).

value 1 if the individual has reached retirement age and 0 otherwise, $f(\cdot)$ and $g(\cdot)$ are flexible functions of age.

5. Empirical analysis

In this section we present the results of the estimation of the fall in consumption due to retirement induced by eligibility. Three sets of results are presented for food consumption, non-durable consumption and total consumption (sum of the previous two categories).

In the empirical modeling we follow the work of Battistin et al. (2009) and use a parametric approach which provides a reasonable fit to the data. We limited the estimation sample to a 10-year band before and after pension eligibility. The sample was then split into cells defined by the quarters to/from eligibility; this gives us 80 cells/observations. For each cell we compute the average household consumption and the proportion of household heads receiving a pension. The average sample size across the cells varied from a minimum of 26 to a maximum of 146 observations. In the estimation, people who are within three months of their 60th birthday are excluded, as the recall questions on consumption for those who are retiring may cover both pre- and post-retirement periods. As a smoothing parameter we choose a second-order polynomial.

5.1. Graphical presentation

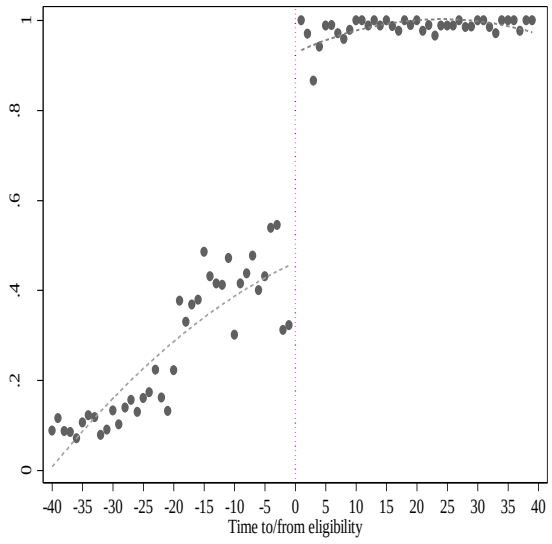
We start with a graphical presentation of pension take-up rates and consumption change due to retirement. In all cases we also show the fitted values from a quadratic regression model estimated separately on either side of the cut-off. In Figure 1 panel a presents the proportion of retired heads of households by time to/from eligibility. We

observe a steady increase in the number of pension claims as people approach the threshold of retirement eligibility. Crossing the threshold is clearly associated with a discontinuous increase in take-up rates.

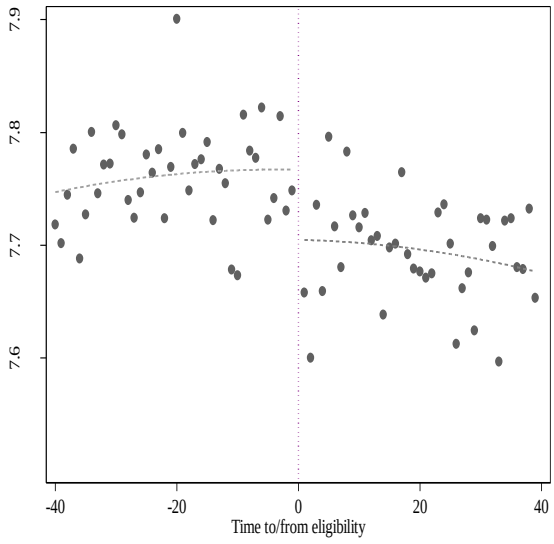
We next examine the distribution of consumption data. Figure 1 presents the results for total consumption (see panel b.) and food (see panel c.) and non-durable consumption (see panel d.) separately. We observe a significant decline, at the threshold, for total and food consumption. At the same time we do not observe a change in non-durable consumption upon reaching retirement age.

Figure 1: Proportion of retired household heads and consumption by time to/from eligibility

a.

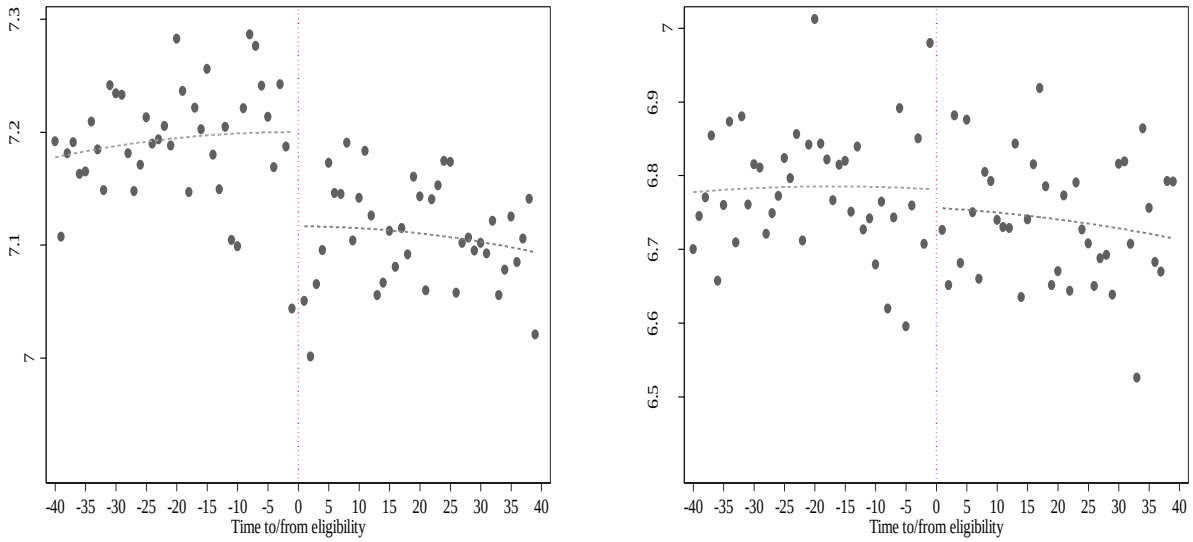


b.



c.

d.



Note: The sample is based on data from the National Survey of Household Welfare and Social Program Participation (NOBUS), 2003. Time to/from eligibility is measured in quarters, with positive (negative) values denoting the number of quarters from (to) eligibility to retire. Retirement is defined as receiving an old-age pension. Total expenditure includes expenditure on food and non-durables. Food expenditure includes expenditure on food items bought, produced at home or received in kind. Expenditure on non-durables includes spending on housing, health, transport, communication, recreation and education. The lines are fitted values for a regression that includes a second-order polynomial in age and a dummy variable for the quarter when people turn 60. The points represent means for people in each age cell (measured in quarters). Points for people age 60 are not shown in the charts.

5.2. Regression results

In this section we present the estimation results for total consumption, and food and non-durable consumption. The first-stage regression of retirement status on pension eligibility, a second-order polynomial in age, yields an R^2 of 0.97 – the coefficient of eligibility, γ_1, is estimated at 0.465, with a standard error of 0.025.

The results for total consumption are reported in the first column of Table 2. They suggest that total consumption drops by 13.8 percent at retirement, which is significantly different from zero at the 1 percent level. The results for food consumption are reported in the second column of Table 2, suggesting a larger drop of 17.8 percent, which is also significantly different from zero at the 1 percent level. Finally, the last column of Table 2 presents the estimates of non-durable consumption. The results suggest that non-durable

consumption declines by 7.8 percent and the estimate is not statistically significant.

Table 2: Regression discontinuity models, retirement is defined as receiving an old-age pension

	Total consumption	Food consumption	Non-durable consumption, including government sub.
	(1)	(2)	(3)
Retired	-0.138***	-0.178***	-0.0786
	(0.0501)	(0.0674)	(0.0958)
$f(X-c)$	0.000787	0.00109	0.000217
	(0.000756)	(0.000994)	(0.00147)
$f(X-c)^2$	-0.0000327***	-0.0000372**	-0.0000269
	(0.0000115)	(0.0000162)	(0.0000251)
Constant	7.832***	7.282***	6.825***
	(0.0355)	(0.0507)	(0.0721)
adj. R^2	0.346	0.376	0.050

Note: Robust, clustered standard errors in parentheses, * p<0.1, ** p<0.05, *** p<0.01. The dependent variables in all models are in logs. People who are within three months of their 60th birthday are excluded. The first-stage regression of retirement status on pension eligibility, a second-order polynomial in age, yields an R^2 of 0.97 – the coefficient on eligibility is estimated at 0.465, with a standard error of 0.025.

We found that consumption drops considerably at retirement – by 13.8 percent. Studies for other countries also found a sizable drop in consumption upon retirement. Hurst (2008) points out that this fact is robust across different countries, datasets and methodological approaches. For example, based on Italian data Miniaci et al. (2010) found that consumption fell by 5.4 percent. The authors argue that the estimate should be viewed as a lower bound if there is heterogeneity in work-related expenses and individuals with the highest expenses retire earlier.

Our results suggest that food consumption is responsible for a large part of the decline in consumption. In line with our results, most of the studies find that food consumption drops much more sharply than the consumption of other non-durable items

(e.g. Banks et al. 1998). Should we interpret an inability to smooth consumption as evidence against life-consumption optimizing behavior? Recent research shows that a drop in expenditure after retirement does not necessarily imply a drop in utility. An increase in the amount of spare time available may allow individuals to shop more efficiently. Aguiar and Hurst (2007) show how households substitute time for money through shopping and home production. The authors conclude that about 20 percent of the decline in the food expenditure of older households may be attributed to an increase in shopping intensity and the remaining 80 percent is due to an increased amount of home production.

5.3. Robustness check

We start examining the robustness of our results by checking the sensitivity of our results to the choice of the sample window. The results of the estimation are reported in the top panel of Table 3. We impose a step-wise restriction on the width of the observation window, reducing the width by half. The absolute size of the coefficients remains close to the results reported in Table 2, but the statistical significance is often affected.

Next, we examine the robustness of our results to alternative specifications of the smoothing parameters. In the bottom panel of Table 3 we report the results of the estimations which include third- and fourth-order polynomials. The results appear to be in line with previous findings (see Table 2).

Table 3: Robustness check

	Total consumption	Food consumption	Non-durable consumption
	(1)	(2)	(3)
Narrow observation window			
Retired ($52 \leq$ age ≤ 68)	-0.106*	-0.177**	-0.0110
	(0.0582)	(0.0783)	(0.114)
Retired ($53 \leq$ age ≤ 67)	-0.105	-0.190**	-0.00789
	(0.0632)	(0.0873)	(0.121)
Retired ($54 \leq$ age ≤ 66)	-0.129*	-0.215**	-0.0214
	(0.0676)	(0.0968)	(0.133)
Retired ($55 \leq$ age ≤ 65)	-0.112	-0.170	-0.0392
	(0.0752)	(0.105)	(0.151)
Higher order polynomial			
Retired (3rd order polynomial)	-0.105	-0.193*	0.00306
	(0.0748)	(0.111)	(0.152)
Retired (4th order polynomial)	-0.106	-0.196*	0.00274
	(0.0747)	(0.108)	(0.151)

Note: Robust, clustered standard errors in parentheses, * p<0.1, ** p<0.05, *** p<0.01. The dependent variables in all models are in logs. People who are within three months of their 60th birthday are excluded. The specifications include quadratic polynomials in age.

To obtain further evidence on the validity of our results we implement an overidentification test following Lee (2008). The overidentification test aims to examine whether the observed baseline covariates are "locally" balanced on either side of the threshold. In other words we test whether the local continuity assumption holds. The baseline covariates used in the test should not be affected by the eligibility status, but they should correlate with unobservables, which are likely to affect consumption. In the estimation we used the same procedure as described in Section 2 for a battery of outcomes: education, age of the household head, size of the dwelling and size of the city in which the individual is living. Table 4 presents the results of the test. In all of the cases considered there is no indication of a discontinuity at the threshold.

Table 4: Overidentification test

Primary vocational or lower education (dummy)	-0.0644
	(0.0576)
Secondary vocational or higher education (dummy)	0.0644
	(0.0576)
Age	0.00177
	(0.0111)
Age^2	0.187
	(1.348)
Size of dwelling	-1.459
	(1.726)
City size > 500,000 (dummy)	-0.0329
	(0.0648)
499,000 >city size>99,000 (dummy)	-0.0370
	(0.0735)
50,000> city size (dummy)	0.0699
	(0.0509)

Note: Robust, clustered standard errors in parentheses, * p<0.1, ** p<0.05, *** p<0.01. People who are within three months of their 60th birthday are excluded. The specifications include quadratic polynomials in age.

5.4. Hours of work and an alternative definition of retirement

So far we have assumed that retirement pension recipients automatically switch to economic inactivity. In practice this is not the case. It has been documented previously that the labor force participation of Russian pensioners is high compared to OECD countries. As we mentioned in the previous section, Russian pension law does not penalize working pensioners and thus provides them with the possibility to supplement their pension with labor income. The practice of relying on a pensioner's labor was typical of the Soviet system and has survived until the present day. Moreover, the income replacement rate of pensions in Russia (the ratio of average pensions to average wages) does not exceed 25 percent and thus additional wages may be an important source of income for pensioners.

Using the Russian Longitudinal Monitoring Survey (RLMS) for the 1992 - 1998 period, Kolev and Pascal (2003) found that approximately 35 percent of males aged 60 –

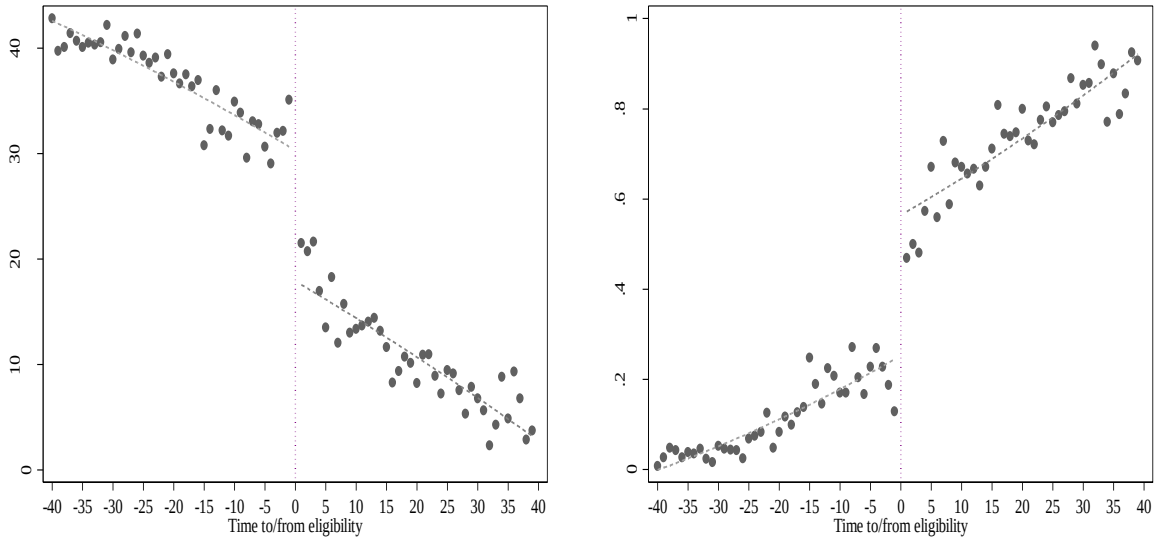
65 were employed. In our data we observe a sizable drop in the number of hours worked as individuals cross the retirement threshold (see Figure 2, panel a). Consequently we modify the definition of the retirement status. In this section we define the retirement status as receiving a pension and supplying zero hours of work.[11] According to the new definition we find a higher share of pensioners in work and a declining trend as people grow older (see Figure 2, panel b). More importantly, we observe a sharp decrease in hours of work and a sharp increase in the proportion of pensioners at the eligibility threshold.

Table 5 presents the results of the estimation. We define an individual as a pensioner if he receives a pension and works zero hours a week. As expected, the consumption drop caused by retirement induced by eligibility is higher when we restrict the definition of retirement to zero hours of work. Total consumption declines by 20.6 percent while food consumption drops by 26.6 percent. The impact of retirement on non-durable consumption is not statistically significant. Given that there is a strong case for taking into account the labor supply of pensioners, we regard the estimates presented in Table 5 as our preferred estimates.

[11] We also looked at alternative measures of employment: positive wages and having a paid job. The results appear to be similar.

Figure 2: Hours of work and the proportion of retired, non-working heads by time to/from eligibility

a. **b.**



Note: Time to/from eligibility is measured in quarters, with positive (negative) values denoting the number of quarters from (to) eligibility to retire. The lines are fitted values for a regression that includes a second-order polynomial in age and a dummy variable for the quarter in which people turn 60. The points represent means for people in each age cell (measured in quarters). Points for people aged 60 are not shown in the charts.

Table 5: Regression discontinuity models with retirement defined as receiving an old-age pension and working zero hours

	Total consumption	Food consumption	Non-durable consumption
	(1)	(2)	(3)
Retired	-0.206**	-0.266**	-0.117
	(0.0790)	(0.110)	(0.142)
$f(X-c)$	0.00153	0.00205	0.000640
	(0.00108)	(0.00148)	(0.00195)
$f(X-c)^2$	-0.00000760	-0.00000477	-0.0000126
	(0.0000116)	(0.0000137)	(0.0000202)
Constant	7.821***	7.267***	6.819***
	(0.0315)	(0.0472)	(0.0630)
adj. R^2	0.319	0.281	0.066

Note: Robust, clustered standard errors in parentheses, * p<0.1, ** p<0.05, *** p<0.01. The dependent variables in all models are in logs. People who are within three months of their 60th birthday are excluded. The first-stage regression of retirement status on pension eligibility, a second-order polynomial in age, yields an R^2 of 0.97 – the coefficient on eligibility is estimated at 0.312, with a standard error of 0.022.

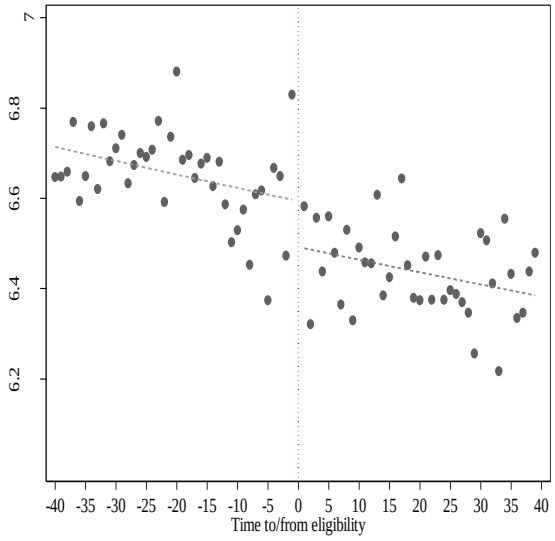
5.5. Impact of government subsidies

So far we have found that food consumption drops by 26.6 percent in response to retirement. At the same time, however, we do not observe a statistically significant decline in non-durable consumption upon retirement. One of the possible explanations for this is the existence of government subsidies for pensioners. Until the end of 2004 Russia had a complex system of government in-kind transfers inherited from its Soviet past. The system included three distinct classes of beneficiaries. First, disadvantaged groups: those who need government assistance such as orphans, people with disabilities and the elderly without pensions. Second, those who had rendered special services to their country (e.g. veterans of war conflicts, and individuals who worked in hazardous or dangerous professions). Third, those who have at some time provided valuable services to the state, (e.g. military and security personnel, recipients of Medals of Honor). Moreover, in response to growing poverty and unemployment many regions introduced additional programs which were based on a similar categorical principle. By the end of 2004 the system included an enormous set of combinations of privileges and beneficiary categories. Yet most of the in-kind subsidies were aimed at pensioners and included subsidies for housing and community services, medical expenses and transport (Alexandrova, Struyk, 2007). The impact of the government subsidies on household consumption in Russia is discussed by Gerry and Li (2008). They find that apart from pensions, government subsidies played only a limited role in consumption smoothing.

In the NOBUS survey, respondents were asked about the amount of government subsidies received for health care, housing and transport. In Figure 3 we present the distribution of expenditure on non-durables net of subsidies. Compared to Figure 2, in

Figure 3 we observe a significant decline in non-durable consumption at retirement. Furthermore we estimate a model of the drop in non-durable consumption net of government subsidies. Our results suggest that in the absence of government subsides, non-durable consumption would decline by 22.3 percent (s.e. 10.8).[12] This is considerably higher than the results shown in the previous section (see Table 2).

Figure 3. Non-durable consumption net of government subsidies



Note: Time to/from eligibility is measured in quarters, with positive (negative) values denoting the number of quarters from (to) eligibility to retire. Non-durable consumption includes expenditures on housing, health, transport, communication, recreation and culture, education and hotels and restaurants. The monetary value of government transfers is excluded. The lines are fitted values for a regression that includes a second-order polynomial in age and a dummy variable for the quarter in which people turn 60. The points represent means for people in each age cell (measured in quarters). Points for people aged 60 are not shown in the chart.

5.6. Household composition

A number of studies indicate that household composition responds to exogenous income shocks (e.g. Edmonds et al., 2005). This in turn implies that taking changes in the

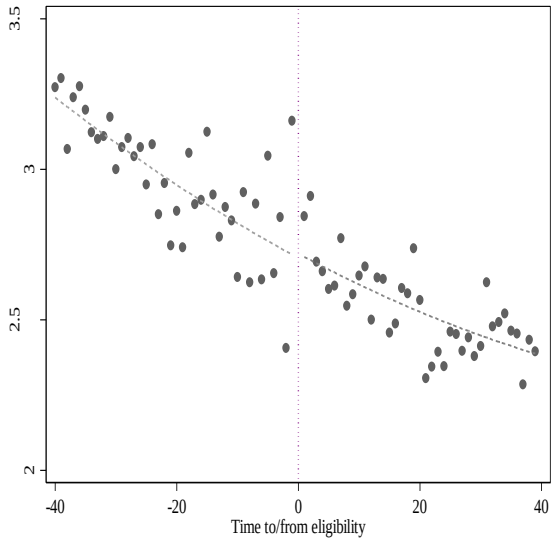
[12] Full results are available on request.

household composition into account may substantially alter conclusions on the consumption trajectories (e.g. Battistin et al., 2009).

Historically, household composition has always been particularly complex in Russia due to housing shortages. When children grow older and get married they tend to leave their parents' household and form a new one.[13] Hence the size of the household is likely to decrease over time. In our sample the size of the household declines gradually from 3.3 individuals when the head is aged 50 to 2.3 individuals when the head is aged 70 see Figure 4). This, however, should not pose a problem for our identification strategy as long as there are no abrupt changes in the household composition at the threshold of pension eligibility. We further test for the presence of discontinuities in household size in a regression framework, as discussed in the previous section, and do not identify any statistically significant discontinuities.[14] To check the robustness of our results to household composition we re-estimate the model by expressing consumption in per capita terms. To take into account economies of scale we adjust household consumption by the square root of the household size, the results are presented in Table 6. The results appear to be similar to those reported in Table 5. We conclude that our estimates of the consumption drop at retirement are robust to household composition.

[13] Intra-household transfers in Russia are found to be of minor importance in the consumption smoothing of older households. In fact the study by Kuhn and Stillman (2004) found that older households were on average transfer "givers".
[14] Results are available on request.

Figure 4. Household size



Note: Time to/from eligibility is measured in quarters, with positive (negative) values denoting the number of quarters from (to) eligibility to retire. The lines are fitted values for a regression that includes a second-order polynomial in age and a dummy variable for the quarter in which people turn 60. The points represent means for people in each age cell (measured in quarters). Points for people aged 60 are not shown in the chart.

Table 6: Regression discontinuity models, adjusted by the square root of the household size

	Total consumption	Food consumption	Non-durable consumption
	(1)	(2)	(3)
Retired, working zero hours	-0.214***	-0.268***	-0.103
	(0.0772)	(0.0961)	(0.157)
$f(X-c)$	0.000379	0.000836	-0.000833
	(0.00107)	(0.00130)	(0.00217)
$f(X-c)^2$	-0.00000870	-0.00000509	-0.0000138
	(0.0000116)	(0.0000135)	(0.0000207)
Constant	8.087***	7.529***	7.076***
	(0.0328)	(0.0413)	(0.0722)
adj. R^2	0.638	0.600	0.261

Note: Robust, clustered standard errors in parentheses, * p<0.1, ** p<0.05, *** p<0.01. The dependent variables in all models are in logs. People who are within three months of their 60th birthday are excluded. The first-stage regression for columns (1)-(4), of retirement status on pension eligibility, a second-order polynomial in age, yields an R^2 of 0.97 – the coefficient on eligibility is estimated at 0.312, with a standard error of 0.022.

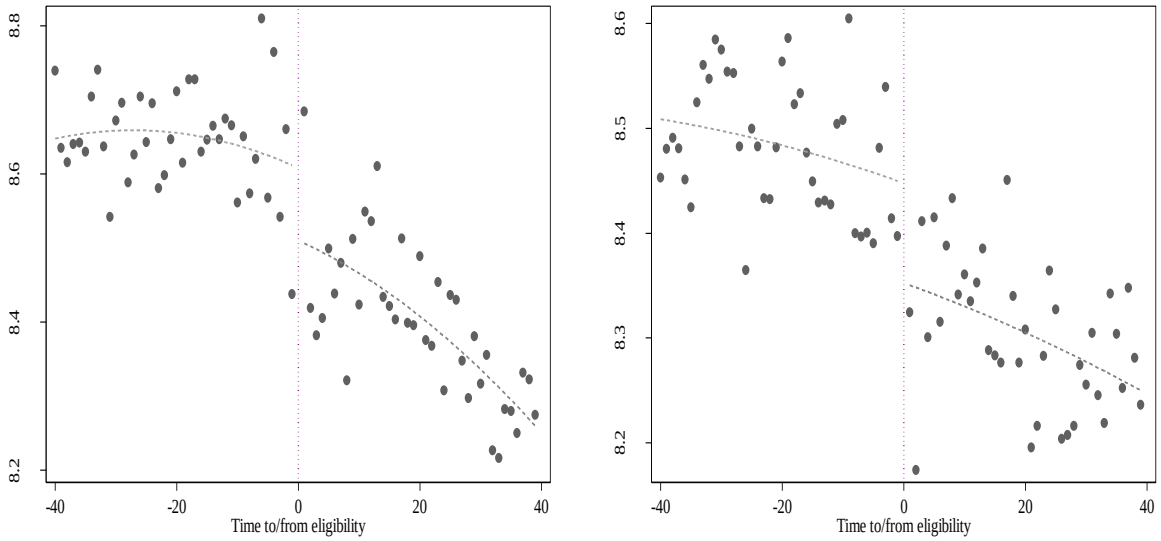
5.7. Household adaptation to retirement

The process of adaptation to changes in income and life situation have received a lot of attention in the recent literature. Easterlin (1974) found that indicators of well-being remained relatively flat for the post-war period in the USA despite the rise in income. There are two possible explanations for the observed phenomenon. The first is that people care more about their relative position or their peers' incomes. The second is that there is a process of habituation to income levels. Easterlin (2005) shows that aspiration to material goods tends to rise with consumption. Moreover, Easterlin (2001) indicates that although retirement is associated with a drop in income, life-cycle welfare remains constant or even increases (see also Blanchflower and Oswald, 2008).

To further examine the issue of adaptation to retirement, we turn our attention to the minimum income question (MIQ) (see Groedhart et al., 1977) which respondents were asked during the interview. In our study the minimum income question was worded as follows: "Could you tell us how much money your family needs to live satisfactorily?". In the left panel of Figure 5 we present the distribution of the responses to the minimum income question. We observe that the subjective perception of sufficient resources diminishes with age. There is also a discontinuity in the perception of sufficient resources at the pension eligibility threshold. The result of the estimation of the regression model (see Table 6, column 1) indicates that the perception of sufficient resources declines by more than 31.1 percent. The estimated fall in the perception of sufficient resources is higher than the fall in consumption found previously (see Table 5). However, our previous measure of consumption does not include work-related expenditures such as meals consumed away from home. Moreover, Ovtcharova and

Tesluk (2008) argue that the user value of the stock of durables owned by the household and the rent paid or imputed for the main dwelling should also be included in the consumption bundle. It is likely that when answering the MIQ respondents were taking into account a "broad" definition of consumption. The right panel of Figure 5 presents the distribution of the consumption measure which additionally includes work-related expenditures, the user value of the stock of durables owned by the household and the rent paid or imputed for the main dwelling. Similar to our previous findings we observe an abrupt change in consumption at the threshold of pension eligibility. The result of the regression model is presented in column 2 of Table 7. According to the new definition of consumption, the consumption drop caused by retirement induced by eligibility is equal to 30.3 percent, which is very close to the drop in the perception of sufficient resources reported by the households. Thus the magnitude of the drop in consumption largely coincides with the fall in the subjective perception of minimum needs.

Figure 5. Response to the minimum income question



Note: Time to/from eligibility is measured in quarters, with positive (negative) values denoting the number of quarters from (to) eligibility to retire. The lines are fitted values for a regression that includes a second-order polynomial in age and a dummy variable for the quarter in which people turn 60. The points represent means

for people in each age cell (measured in quarters). Points for people aged 60 are not shown in the chart.

Table 7. Total consumption and the minimum income question

	Total consumption	Minimum Income Question
	(1)	(2)
Retired	-0.303***	-0.311**
	(0.103)	(0.147)
$f(X-c)$	0.000206	-0.00140
	(0.00137)	(0.00196)
$f(X-c)^2$	-0.00000928	-0.0000639***
	(0.0000135)	(0.0000179)
Constant	8.529***	8.691***
	(0.0440)	(0.0629)
adj. R^2	0.684	0.770

Note: Robust, clustered standard errors in parentheses, * p<0.1, ** p<0.05, *** p<0.01. The dependent variables in all models are in logs. People who are within three months of their 60th birthday are excluded. The first-stage regression for columns (1)-(2), of retirement status on pension eligibility, a second-order polynomial in age, yields an R^2 of 0.97 – the coefficient on eligibility is estimated at 0.312, with a standard error of 0.022.

6. Conclusion

In this paper we have investigated the size of the consumption drop in Russia due to retirement. We used detailed micro data on household consumption of food and non-durables and evaluated the causal effect of retirement on consumption. The identification strategy used in the paper was based on the regression discontinuity design (see Battistin et al., 2009). To obtain the causal interpretation of the effect we made an assumption that consumption should be the same around the threshold of pension eligibility if no one retired. Our results are robust to the choice of the equivalence scale, observation window and smoothing parameters.

Our analysis suggests three important conclusions. First, we find that a significant fraction of individuals who reach retirement age and receive a pension continue to work. Labor supply after reaching retirement age is found to be an important consumption smoothing strategy of Russian households. For pension-recipients who stop working after reaching retirement age we find that consumption declines by 20.6 percent. The retirement age in Russia is relatively low – 60 for men – and the average income replacement rate of pensions are not generous. It is thus not surprising that a lot of people continue working well into retirement. From the policy perspective the current system of awarding pensions at an early age whether or not the recipient leaves the labor force ignores the fact that a significant proportion of older people is able and willing to work longer and to earn a living from employment. At the same time the state pension system does not sufficiently protect the consumption of older people who are not capable of working after reaching retirement age or who are forced to work because of the inadequate size of the pensions. It is thus desirable to raise the minimum retirement age or to introduce restrictions on receiving pensions for people who are working (see also Kolev and Paskal, 2003; World Bank 2002; Hauner, 2008).

Second, we find that the fall in food consumption is greater than the fall in non-durable consumption. Yet the fall in the consumption of non-durables is dampened by in-kind government transfers: if the government transfers did not exist, the fall in non-durable consumption would be much greater. The reform of the social safety net which came into effect in 2005 introduced significant changes in the targeting of the most vulnerable groups. More importantly, most of the in-kind benefits were converted into monetary form. The impact of the reform has not been studied in depth yet. However we

expect that the improved targeting of government transfers should provide better possibilities for the most vulnerable groups of pensioners to smooth consumption. Moreover the monetization of social benefits should ease the fall in food consumption by shifting some of the decline in consumption to non-durables.

Third, we find that the fall in consumption is mirrored by the fall in the subjective perception of sufficient resources. The fact that the perception of sufficient resources declines by the same degree as total consumption may indicate that the observed consumption drop should not be taken as evidence against life-optimizing behavior. We believe that the drop in the perception of subjective resources may be driven by two factors. First, objectively pensioners require fewer resources due to the elimination of work-related expenditures. Second there is a process of subjective adaptation towards decreasing resources available for consumption. Taking into account the fact that our effect identifies the magnitude of the consumption drop only for retired individuals who are marginally eligible to retire (i.e. those who have just turned 60) we believe that objective necessities dominate the subjective process of adaptation.

Our results have some important limitations which mainly concern heterogeneity in the ability to smooth consumption. First of all, the NOBUS dataset does not provide information on wealth. Household wealth has been found to be an important determinant of consumption smoothing abilities (e.g. Bernheim et al. 2001). The authors show that most of the consumption drop occurs among poor households. Second, we do not have information on whether retirement was the consequence of some unexpected shock. For example, Smith (2006) finds that the most significant drop in consumption is observed for individuals who retire early due to health problems or involuntary unemployment.

The relatively small number of observations does not allow us to split the sample into educational subgroups. Education has been found to be an important determinant of coping with consumption shocks in Russia (Mu, 2006). Finally, an acute question is whether our results could be generalized to other periods, after all the data at hand covers only one year. Gorodnichenko et al. (2010) analyze changes in the consumption smoothing abilities of Russian households during the 1994-2005 period. Based on a sample of working-age individuals the authors conclude that the response of consumption to permanent and transitory income shocks becomes weaker over time. We believe, according to the results found in this paper, that the retirement consumption drop in Russia was greater at the beginning of the 1990s and smaller in the second half of the 2000s.

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