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This paper investigates to what extent Russian households have been able to protect their consumption against income shocks during the transition and in what manner the ability to smooth consumption is related to poverty risk. We use data from the Russian Longitudinal Monitoring Survey (1994-2004). Empirical analyses of such panels have often been based on differenced data in order to eliminate individual household effects. An innovative aspect of this study is that we model households smoothing behaviour by means of an Error Correction Mechanism (ECM); this model explicitly distinguishes between short and long run dynamics of consumption and income and thus better exploits the information in the level data. We find that households are only partially able to protect their consumption from income shocks and that income shocks have a smaller impact on food consumption than on non-food consumption. The results also suggest that the population is not homogeneous in terms of consumption smoothing abilities; partial estimations show that consumption smoothing ability improve as the living standard increases. However, below average consumption smoothing abilities are not always associated with higher poverty risk; rural households, who have a high poverty risk, manage to smooth food expenditures quite well, most likely because they have more opportunities to produce their own food. These exploratory results suggest that development and social protection policies should not only play a role in terms of poverty reduction but also influence households' abilities to manage risks.

Keywords: poverty, consumption smoothing, error correction model, Russia

JEL: D12, D31, I32

1. Introduction

During the last decade, the Russian Federation experienced that the transition from a central planned economy to a market based economy is full of bumps, potholes and off the road experiences. For the Russian people, the transition process involved a surge in uncertainty (May 1999). Unemployment was essentially an unknown phenomenon in pre-transition Russia. The closing down or privatization of the large public industrial and agricultural companies resulted in mass unemployment and decreased job security. Those still having a job faced wage payment arrears and forced unpaid leave arrangements. The cutting down of subsidies on food and energy resulted in an increase in the cost of living. Additionally, in order to make a living in this new market economy, other skills and abilities were required.

The transition phase has required all the resourcefulness of the Russian people in order to make ends meet. Participatory poverty studies in transition economies reveal that the inhabitants of these countries experienced and disliked the surge in uncertainty that accompanied the transition phase (World Bank, May 1999). Economic theory shows that uncertainty about future income and consumption flows reduces the expected satisfaction that risk adverse individuals can derive from it. In this respect, people's ability to respond to uncertainty and to deal with shocks reflects an important dimension of well-being. In contrast, widely used poverty statistics merely describe the level of welfare enjoyed by individuals at a particular point in time. The ability of consumption smoothing and the level of welfare each reflect relevant but different dimension of welfare. Our aim is to investigate the extent to which Russian households have been able to protect their consumption against income shocks during the transition period and how this ability of consumption smoothing is reflected in terms of poverty risk. We investigate whether the characteristics of high poverty risk households are the same as those for households with low smoothing abilities. As such this paper contributes to the literature on welfare and poverty because it enhances our understanding of the relation between the dynamics of a welfare generating process (ability to smooth consumption) and its outcome in terms of welfare at a particular point in time (poverty).

We use data from the Russia Longitudinal Monitoring Survey (RLMS) from 1994 to 2004. The cross-section component is used to calculate a range of absolute poverty indices and a poverty profile. The panel dimension is used to investigate poverty dynamics and to estimate the overall ability of household consumption smoothing. This study is the first to explicitly incorporate short and long run dynamics in the ability of consumption smoothing; households' income and expenditure flows are modelled using an Error Correction Model (ECM) which better exploits the information in the data. The short run income elasticity measures the responsiveness of household expenditures to changes in income and is our measure for households' smoothing abilities; a high income elasticity reflects a low consumption smoothing ability and vice versa.

The results show that households are only partially able to protect their consumption from income shocks. We also find that income shocks have a smaller impact on food expenditures than on non-food expenditures. We further find exploratory evidence of heterogeneity in consumption smoothing abilities; by estimating the model separately for subgroups in the sample we find that the abilities of consumption smoothing vary according to household characteristics. Surprisingly, low abilities of consumption smoothing are not always associated with high poverty risk; rural households, who have a high poverty risk, manage to smooth food expenditures quite well, most likely because such households have more opportunities to produce their own food. Households with pensioners on the other hand have a lower poverty risk but also have high consumption smoothing abilities. As households' average (long term) living standard increases, they are better able to smooth non-food expenditure. These exploratory results indicate that there is a potential role for development and social protection policies to influence households' abilities to deal with risks and that the scope of such policies should be broader than the social assistance type of poverty-reduction policies. It may involve an extension of the coverage of the social security net but can also be aimed at improving the functioning of market-based institutions such as increased monitoring and supervision of the financial sector.

This paper is organized as follows; section 2 describes the RLMS data and the main variables used. Section 3 reports the main developments of the Russian economy followed by the results from our poverty analysis. In section 4, we discuss the relevance and theoretical background of consumption smoothing. Section 5 specifies the dynamic model of consumption smoothing abilities after which the estimation strategy is set out in section 6. Section 7 reports the results from the exploratory analyses and relates the findings on households' consumption smoothing abilities to those on the duration of poverty and poverty risk. Section 8 concludes.

2. Data and methodology

We analyze poverty and consumption smoothing abilities using data from the RLMS project for the years 1994-2004.[1] These data can be analyzed as (repeated) cross-sections and as a panel. We selected those households that were observed in at least one round and had no missing observations on any of the variables used in the analysis. For the poverty analysis we use predominantly the cross-section dimension of the RLMS but we also use the panel to compute some indicators of poverty dynamics. Measuring consumption smoothing abilities requires panel data. Because of missing surveys in 1997 and 1999, the time intervals between surveys are not equally spaced, a complicating factor for the dynamic analysis. To solve this problem we selected those households that were observed for at least 3 consecutive two year periods (i.e. 1994, 1996, 1998, 2000, 2002 and 2004). Households that had missing observations on any of the variables were dropped. The sample includes so-called offspring households; these are households that are created when a household split up into two households and both households remain in the RLMS sample. Whenever this happened, from that round on, one household kept the original identification code while the offspring household received a new identification code.

[1] Detailed information on the RLMS project is provided on the following website: http://www.cpc.unc.edu/projects/rlms/home.html.

However, for the previous rounds both households shared an identical past. We treated offspring households as new households.[2]

We have included the following variables: food-, non-food-, and total expenditures, total household income, number of household members divided over 6 age categories (children 0-6, children 7-18, male aged 19-60, female aged 19-55, male aged 60 and above and female aged 55 and above) and categorical variables providing information on the household's location such as rural, urban, semi-urban, region and community.

The poverty analysis is performed using the poverty lines constructed by the RLMS. These are based on regional age-gender specific food-baskets that are valued at regional prices. These absolute poverty lines were calculated for each household and are adjusted for the demographic composition of the household. As welfare indicator we use total household expenditures and its construction is primarily based on the constructed expenditure categories provided by the RLMS. Total food consumption is obtained by adding the expenditures on dairy, meat, fish, potatoes, alcohol, bread, eggs, fats and oils, fruits, sugar, vegetables, other foodstuffs, the value of food eaten outdoors and the value of food consumed and produced at home. Total non-food consumption is obtained by summing expenditure items such as tobacco, clothing, fuel, services, durables, luxury items, recreation, rent[3], utilities and other payments such as tuition and insurance (excluding loans)[4]. The value of total consumption is expressed in June 1992 prices by dividing the current price of expenditures by the regional consumer price index. The welfare indicator slightly differs from the RLMS total household expenditure variable as we excluded savings and expenditures on bonds from the aggregation because these

[2] The annex provides a table comparing household characteristics in the cross-section with those of the panel. More information about sample attrition of the RLMS can be found on the RLMS website in a document written by Heeringa and Arbor (1997).
[3] This expenditure category does not include any imputations for the rent of house owners.
[4] Although income and expenditures are expressed in monthly values, the reference period in the questionnaire for the various expenditure and income categories varied from a week for items such as food, a quarter of a year for durables to a year for the harvest from home produced foodstuffs.

flows reflect investments in the stock of assets and as such do not contribute to current consumption.[5] [6]

For the analysis of consumption smoothing we have composed real household expenditures the same way as for the poverty analysis. Household income consists of cash income as well as the monetary value of in-kind income. The income variable is also expressed in constant prices and is constructed by summing income from salary, rent, interest receipts, pension benefits, child allowances, maternity benefits, family and other benefits, gross income from sales of farm products and other income. We excluded the income from unemployment insurance, insurance benefits, property or jewellery sales, transfers received from friends and relatives and money borrowed, because these sources of income are likely to reflect ex post adjustments to income shocks.[7]

Table 1: Per capita average of income and expenditures, monthly - 1992 ruble

Round	Year	# of households	Expenditures			Income
			Food	Non-food	Total	
5	1994	3,586	2,485	1,263	3,747	2,736
6	1995	3,441	2,124	1,165	3,287	2,159
7	1996	3,234	1,753	1,194	2,946	2,060
8	1998	3,108	1,312	843	2,154	1,596
9	2000	3,015	1,401	1,139	2,539	1,907
10	2001	3,137	1,505	1,355	2,859	2,300
11	2002	3,132	1,514	1,435	2,948	2,582
12	2003	3,102	1,505	1,723	3,227	2,758
13	2004	3,052	1,496	1,766	3,262	2,941

Source: RLMS cross-sections

[5] Due to limitations in the data the welfare indicator does not include values for the consumption of public goods or for house ownership while consumption of these goods clearly contributes to the level of household welfare.

[6] From round 9 on, the expenditure section of household questionnaire has been adjusted resulting in more detailed questions for expenditures in health and other services. This change lead to an increase in reported expenditures in these categories. For time consistency reasons, the poverty rates reported in this paper are calculated excluding these new categories. Poverty estimates using the expenditures aggregate including these categories yield lower poverty rates but this does not seem to have a large impact on the relative poverty risks of groups in the poverty profile.

[7] As will be explained further in section 4, we measure the consumption smoothing abilities by analyzing the responsiveness of household expenditures to income shocks. When an income shock occurs, households may smooth consumption by asking help from friends, selling assets, borrowing money, applying for unemployment benefits and the like. These sources of income are the result of post-shock smoothing efforts and should not be included in the income indicator as they would underestimate the magnitude of income shocks.

Data inspection showed that a small number of households did not have positive values for the expenditure variables. We have excluded households for which food or total expenditures were not positive. Table 1 provides the average per capita values of the key variables in each round for the cross-section dimension of the survey. Expenditures are systematically above income for two reasons. Firstly, as explained above we have excluded a number of income categories because they are likely to reflect ex post shock adjustments. However, even when these categories would be included a (smaller) discrepancy would remain. Another reason for this gap between income and expenditures suggested in the literature is that households have a tendency to underreport income from informal and semi-formal activities (Atkinson, 1995; Deaton, 1997; Ravallion, 1994). Other alternative explanations such as dissaving or memory failure cannot convincingly explain the discrepancy over time. Dissaving can of course explain why some households maintain expenditures above their income, but the data suggest that the gap is a general phenomenon which would imply that the whole society would be dissaving during the transition. Higher levels of dissaving are likely to occur during financial crises and high inflation periods but at the time of the financial and economic crisis in 1998 the gap between income and expenditures was actually smallest. Similarly, because survey methodology often relies on respondents' memory for the collection of income and expenditures (and the RLMS is no exception) such data suffer from underreporting, particularly because respondents forget to report sporadic expenses or income. But this type of memory failure applies to both income and expenditures.

3. Russia in transition

The first stage of the transition from a centrally planned economy to a market economy was characterized by a sustained fall in production in all sectors of the economy that lasted until the mid-nineties. Table 2 reports a number of macroeconomic indicators which reflect this trend. Annual GDP growth has been negative during the first years of transition. Both the GDP deflator and the consumer price index show evidence of high and increasing inflation rates. This trend was accompanied by a development of rising inequality and poverty (Commander, Tolstopiatenko, & Yemtsov, 1999; Milanovic,

1998; World Bank, 1995, 1998). In 1997, the Russian economy was showing some hesitant signs of recovery that were swiftly followed by the financial and economic crisis of 1998; a default on domestic and foreign debts was announced followed by a gulf of bankruptcies in the banking sector, a devaluation of the ruble and a collapse of the stock market (Brown, 1999; Buchs, 1999; Sapir, 1999; Slay, 1999). Since 1999, a period of sustained recovery followed, reaching positive GDP growth rates with a peak of 10% in 2000. The sustained increase of unemployment rates from 1994 to 1999 mainly reflects the process of structural change in the Russian economy but also the impact of the economic crisis in 1998. Other indicators for the structural changes in the economy during the transition phase are the employment shares in different sectors of the economy; we can see a large decrease in employment in the industrial sector, a somewhat more modest decrease in agricultural sector employment and a large increase in service employment.[8]

Table 2: Macro-economic indicators

	1994	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
GDP growth (%)	-12.6	-4.1	-3.6	1.4	-5.3	6.4	10.0	5.1	4.7	7.4
GDP deflator (1997=100)	24.4	59.6	86.9	100	119	204	281	328	379	434
CPI (2000=100)	6.9	20.6	30.4	34.9	44.6	82.8	100	121	141	160
Unemployment (%)	8.1	9.5	9.7	11.8	13.3	12.6	9.8	8.9	8.6	n.a.
Employment (%)										
Agriculture	16.1	15.7	15.3	12.2	11.5	11.8	n.a.	n.a.	n.a.	n.a.
Industry	35.9	34.0	32.5	30.0	29.4	29.4	n.a.	n.a.	n.a.	n.a.
Services	47.7	50.0	52.2	57.8	59.1	58.8	n.a.	n.a.	n.a.	n.a.

Notes: * Not available (n.a.)
Source: World Development Indicators (2005)

Such dramatic macro-economic developments must have also affected the living standards of the people. We analyze the impact of the transition phase on the Russian population in terms of absolute poverty. We compute aggregate poverty and a poverty profile using the Foster Greer Thorbecke class of decomposable poverty indices (Foster, Greer, & Thorbecke, 1984):[9]

[8] During the transition many industrial and agricultural state monopolies were privatized, restructured or shut down, in all cases leading to a reduction in the employment in these sectors.
[9] We have also performed the same poverty analyses using the RLMS constructed total income variable as a welfare indicator. The poverty indices and poverty profile decompositions show similar trends and

$$FGT = 1/n\left[\sum_{c_i \le z}\left[\frac{z - c_i}{z}\right]^{\alpha}\right] \qquad 1$$

where n is the total number of individuals, z is the absolute poverty line and c_i is the welfare indicator of an individual (measured by expenditures). If $\alpha = 0$, then equation 1 represents the headcount index which simply displays the percentage of individuals living below the poverty line. Taking $\alpha = 1$ results in the poverty gap index; this index measures the mean proportionate expenditure shortfall over the total population. The poverty severity index is calculated by squaring the expenditure shortfalls before aggregation (setting $\alpha = 2$), thus putting a higher weight on larger shortfalls. These poverty indices are calculated using household post-stratification weights and thus are representative for the Russian population.[10]

Table 3: Poverty indices

	1994	1995	1996	1998	2000	2001	2002	2003	2004
Headcount	11.9	19.0	22.2	34.3	23.3	16.7	14.4	11.5	12.3
Poverty gap	3.8	6.3	8.2	12.7	8.0	5.7	4.8	3.6	3.8
Poverty severity	1.9	3.1	4.5	6.7	3.9	2.8	2.5	1.8	1.8

Source: RLMS cross-sections

The 1998 crisis had a severe impact on the level of well being. All poverty indices show an increase from 1994 to a peak in 1998, followed by a sustained fall (Table 3). The headcount index shows that the percentage of poor individuals nearly triples from 11.9% in 1994 to 34.3% in 1998.[11] The average expenditure shortfall rose to a peak of 12.7% in 1998, decreasing until 3.6% in 2003. The poverty severity index reveals that, in addition to an increase in the number of poor individuals and the average poverty shortfall, poverty also became more severe in the sense that more individuals were experiencing larger shortfalls during the crisis. In 2004 there was a small increase in poverty to 12.3%.

poverty prone groups. Since reported income is structurally lower than expenditures in the RLMS data, the estimated poverty levels and poverty gaps are higher when using income as a welfare indicator. We interpret this discrepancy to be the result from a tendency of households to underreport income.

[10] These weights attempt to match certain demographic characteristics of the sample to those observed in the 1989 census. The household-level weights adjust according to household size and urban-rural residence.

[11] The dramatic trend in poverty indicators appears even more exacerbated because there were no RLMS surveys in 1997 and 1999 and the 1998 survey was performed in November/December, when the impact of the August financial crisis was transmitted to the Russian population.

Table 4: Poverty profile based on headcount index

	1994	1995	1996	1998	2000	2001	2002	2003	2004
Overall	11.9	19.0	22.2	34.3	23.3	16.7	14.4	11.5	12.3
By: Settlement type									
Urban	10.8	17.3	17.8	33.3	20.9	14.3	10.8	7.9	8.0
Semi-urban	13.2	16.0	26.2	34.9	19.4	8.7	16.0	13.6	25.9
Rural	14.7	24.1	32.3	36.4	29.8	24.6	22.6	18.9	18.5
By: Household size									
1	16.9	19.2	18.4	30.9	16.0	14.3	12.2	11.0	9.9
2	10.5	14.1	18.4	28.8	20.0	14.9	12.9	10.7	10.2
3	11.0	20.5	21.2	35.5	21.6	16.1	15.2	11.9	10.8
4	10.8	18.2	23.7	37.6	25.7	15.4	11.2	10.1	11.9
5	12.4	24.0	24.0	35.9	25.7	19.4	13.6	11.5	16.2
>5	17.7	21.2	29.8	33.1	31.0	26.0	28.8	18.0	20.9
By: Number of children									
0	11.9	15.5	18.1	31.4	19.6	16.1	14.2	11.0	11.1
1	9.7	19.3	21.3	32.0	21.7	15.5	12.3	10.8	11.3
2	11.2	20.7	26.1	40.4	29.0	18.2	13.0	10.2	12.9
>2	23.9	28.8	34.7	39.8	35.5	23.9	32.0	25.2	27.3
By: Number of pensioners									
0	11.8	19.9	24.1	36.8	24.1	17.1	14.6	11.2	12.2
1	13.6	21.2	21.3	36.3	26.4	16.5	15.1	13.6	14.9
>1	9.4	11.6	16.6	21.8	15.5	15.7	12.2	9.3	8.5
By: Household type									
Single adult	16.4	16.8	17.5	33.3	20.0	15.7	14.3	11.3	11.5
Single pensioner	15.1	18.6	15.5	28.4	13.4	11.6	10.2	9.2	7.6
Adult couple no kids	7.6	12.7	19.1	32.9	17.8	15.9	13.7	13.5	8.7
Elderly couple (≥1 pensioner)	10.3	11.2	14.4	22.4	16.2	12.7	8.7	8.7	8.6
Single adult & kids (<18)	15.2	22.6	27.3	42.8	33.2	19.8	20.3	11.3	16.9
Adult couple & kids (<18)	10.0	18.5	22.7	35.7	22.0	14.5	10.2	8.2	8.1
Triple generations household	10.9	22.2	20.8	33.2	25.8	19.1	17.4	14.9	14.5
Other households with pensioners	13.4	16.2	21.6	34.5	26.2	17.2	15.1	11.7	14.4
Other households	12.8	21.9	23.3	36.7	24.9	18.3	16.3	12.3	14.6

Source: RLMS cross-sections

Table 4 the headcount index is calculated for subgroups of the Russian population.[12] The trends observed in the aggregate poverty indices are also reflected for these subgroups; the impact of the crisis was felt by large parts of the population, irrespective of their characteristics. Individuals living in rural areas are disproportionately more often poor

[12] Albeit not reported here, we also calculated poverty gap and poverty severity indices for different household characteristics. These indices also show higher values when the poverty headcount rates are high.

than those living in urban areas while. However, it is clear that especially the people living in urban and semi-urban areas suffered from the crisis. The urban headcount index tripled from 1994 to 1998 while the rural headcount doubled. In urban areas, on the other hand, individuals seemed to recover faster from the crisis. In absolute terms poverty is higher in urban areas, as individuals from rural areas comprise about 27% of the Russian population.

Individuals living in larger households typically have higher than average poverty rates than those in smaller sized households. Households with children are more likely to live in poverty than households with no children and the higher the number of children, the higher the poverty headcount. It seems however that this situation changes for 2002 and 2003; in these years only individuals living in households with more than 2 children have above average poverty risk. For the households including elderly household members (age $\geq$ 55 for women and age $\geq$ 60 for men) the results are somewhat mixed; individuals living in households with more than one elderly household member clearly fall less often into poverty than those in households without elderly but individuals living in households including one elderly person seem to have an above average poverty risk. However, when decomposing according to specific household types it can be seen that households comprised only of elderly couples and elderly singles have lower poverty risk. The household types show that single adults, usually females, are also particularly vulnerable to poverty.

Table 5: Poverty dynamics, 1994-2004 (two year intervals)

	1994-2004
Average poverty ratio	
$\leq$ PL	8.1
> PL$\leq$1.5PL	15.8
>1.5PL$\leq$2PL	17.0
>2 PL $\leq$2.5PL	16.9
$\geq$2.5PL	42.2
Chronic poverty groups	
Always poor	2.1
Sometimes poor & average expenditures below poverty line	6.0
Sometimes poor & average expenditures above poverty line	40.6
Never poor	51.1

Source: RLMS panel (measured at 2 year intervals from 1994 to 2004)

Insights into longitudinal aspects of poverty in Russia can be gained using RLMS panel.[13] An interesting indicator in this respect is the average ratio of household's total expenditures over its respective poverty line.[14] This poverty ratio shows the distance of the average living standard of the household relative to the poverty line; a value below 1 indicates that a household, on average, lived in poverty during the transition period and vice versa for an average above 1. Of the RLMS panel, 8% of the households had a ratio below 1, 16% a ratio between 1 and 1.5, 17.% between 1.5 and 2, 17% for the range 2 and 2.5, and 42% of the households had poverty ratios well above the poverty line (>2.5). This shows that quite a number of households were living in the vicinity of this absolute poverty line during the transition period. From a slightly different perspective, 2% of the RLMS households were always poor during the observed period, 6% was sometimes poor and had on average expenditures below the poverty line. 41% of the households had on average above poverty line expenditures but still experienced poverty at least once. Only 51% of the households did not experience poverty during the transition period. The first two groups are also often labelled as 'chronic poor' while the third group is called 'occasional poor'.

4. Consumption smoothing: conceptual and theoretical framework

The previous section showed that the period from 1994-2004 has been very volatile in a macro-economic sense and this instability is clearly reflected in the annual and long term absolute poverty indicators as large parts of the Russian population experienced poverty and/or had *on average* a living standard just above the minimum acceptable living standard. As much as 49% of the households experienced one or several poverty spells in the period but we also saw that some households have a higher poverty risk than others. As such, the economic transition in Russia represents an important aggregate source of uncertainty for Russian households. Participatory poverty studies indicate that people in transition economies indeed associate the transition period with substantial increases in

[13] The panel comprises those households that were observed for at least 3 consecutive two year periods (i.e. 1994, 1996, 1998, 2000, 2002 and 2004).
[14] The absolute poverty lines in the RLMS are household-specific; they take the demographic composition and size of the household into account. The poverty ratio can thus also be viewed as equivalent household expenditures.

uncertainty (World Bank, May 1999). On top of that, households in Russia are exposed to a wide range of idiosyncratic risks and shocks such as illness, disability or death of a household's member, job loss but also crop failure or loss of assets. In this section we firstly discuss why and how households respond to uncertainty and shocks and introduce the concept of consumption smoothing, after which, we set out our theoretical approach.

Economic theory suggests that uncertainty about future income and consumption reduces the expected satisfaction that risk adverse households[15] can derive from it. At the same time, this represents a motivation for households to respond to the risks threatening their future well being. When such actions are successful, households are able to smooth consumption over time, even in when faced with income shocks. As such, the ability to smooth consumption reflects an important dimension of well-being.

Households respond to risks and shocks through saving, borrowing, adjusting labour supply, cultivating land and selling assets. Such strategies are sometimes classified as 'self-insurance' (Skoufias, 2003). Alternatively, households can also rely on other people through informal, private or government risk sharing or private market insurance schemes offered by financial institutions (Deaton, 1997; Fafchamps & Lund, 2003). The possibilities for coping with shocks are partly determined by households' assets (Neubourg de & Notten, May 2002; Neubourg de & Weigand, 2000). These "haves" can be examined in a broad context: households have assets in the form of human capital (skills, experience), physical capital (land, house), social capital (friends, family, acquaintances) and financial capital (cash holdings, savings). In addition, the household environment partly determines the possibilities of what households can do with these "haves". For example, if banks do not provide loans to households or the household lacks sufficient financial collateral to obtain one, households are effectively constrained in their access to financial services. Households might however, obtain credit through other channels, such as social networks (through family members, neighbours or acquaintances) or informal money lenders. Given differences in households' assets and

[15] We take households as the unit of analysis because the household represents the first level at which individuals typically share resources. We thus implicitly assume that resources are equally shared within the household. Of course, in the analysis we control for (changes in) household composition.

environment, it is very likely that households are not able to smooth their consumption to the same extent.

Our aim is to investigate the overall ability of Russian households to smooth consumption during the transition period and whether this smoothing ability differs between household characteristics. We are further interested in the relation between households' poverty risk and its consumption smoothing abilities. We measure consumption smoothing abilities by looking at the extent to which households are able to protect their consumption against income shocks. Shocks such as illness, disability or the death of a household member have a direct impact on household income when they involve a household member that actively participates in household's income generating activities. However, even when such shocks affect non-active families there might be an indirect impact on household's income through adjustments in the internal household task division. Active members can reduce labour supply so that they have more time for caring activities or household tasks. Job loss, wage payment arrears and involuntary unpaid leave also affect impact household income. Extremes in climate (i.e. drought, floods) or diseases leading to crop failure also affect household income in the sense that fewer home produced products can be sold or consumed. Inflation or price adjustments for goods directly impact the real value of consumption that can be attained, particularly if income is not or only partly adjusted for price increases.[16]

In the economic literature there are a number of approaches modelling consumption smoothing behaviour (Deaton, 1992; Deaton & Muellbauer, 1980). One approach models households' insurance decisions using an Arrow-Debreu economy. In this economy uncertainty exists because there are different possible states of the world that can prevail in the future. The concept `state of the world' is analogous to the range of weather types that can occur; just as there can be rain, sunshine or snow, the economy can find itself in an upturn, slump or crisis. Each state of the world yields different opportunities for different consumers resulting in different income distributions over states. As a result, opportunities for risk sharing between risk adverse consumers arise. Risk sharing can

[16] By using real values for income and expenditures one can measure the impact of such shocks.

take place through trading state contingent claims on a complete `Arrow securities' market. This implies that, for each state of the world and time period, there exists an asset that will pay out if that state occurs and does not pay in any other state of the world. Under this framework, perfect consumption insurance against idiosyncratic risks is possible; for every state of the world consumers can buy a different security. Albeit very abstract, this market for state contingent claims could be considered as a simple approximation to the wide range of formal and informal insurance arrangements across space and over time that households can enter into to protect them from risk (Deaton, 1992, 1997). This model has been used in a number of empirical studies (Altonji, Hayashi, & Kotlikoff, 1992; Cochrane, 1991; Mace, 1991; Skoufias, 2003).

Townsend (1994) also developed a risk sharing model within a general equilibrium framework which allows for the evaluation of the joint impact of all insurance arrangements within a village economy. In his model uncertainty exists but there is no such thing as a market for state contingent claims nor is there any modelling of risk-sharing markets or institutions; the assumption that individuals are risk averse provides sufficient rationale for risk-pooling. Thus, the theory does not take into account how this risk-sharing takes place. The solution to this intertemporal choice model suggests that in a Pareto optimal allocation all variation in consumption across households is related to variation in aggregate, village level, consumption (controlling for the household demographic composition) because all the impact of all other shocks is shared among the villagers.

Finally, there are also models where consumption is smoothed over time is achieved through savings and credit markets (Deaton, 1992). The basic model draws upon the work of Friedman's permanent income theory of consumption which predicts that consumption is determined by the value of lifetime resources. The main feature of this model is the permanent income hypothesis: consumption is the annuity value of the sum of expected human and financial resources i.e. the consumer plans to die with no assets. The model implies that the rational and risk adverse consumers prefer stable consumption and use financial markets to achieve this stability. Therefore anticipated changes in

income should not affect consumption. Only unanticipated shocks influence consumption and the impact depends on the nature of the shock; if a shock is temporary, consumption will only change a little but if the shock is permanent the change in consumption can be considerable. In the basic permanent income model future income flows are certain implying that the only savings motive is consumption smoothing over the life cycle. Deaton (1997) shows that when income flows are uncertain, precautionary savings motives exist. Intertemporal choice models use utility functions f(x) that are continuously differentiable, where f(x)'>0 and f(x)"<0 additionally provide information about 'prudence' of the consumer. "Prudence is meant to suggest the propensity to prepare and forearm oneself in the face of uncertainty" (Kimball, 1990, p.54). The degree of prudence is reflected in the third derivative of the utility function; if f(x)"'>0 (i.e. when the marginal utility function is convex) a consumer who is confronted with an increase in uncertainty of future consumption will reduce current consumption and increase saving.

The theoretical models discussed above describe perfectly functioning institutions: whatever the instruments available for consumption smoothing (whether through insurance markets, credit and savings markets or informal risk sharing), the main idea behind these models is that risk averse consumers prefer, and therefore make arrangements to obtain, stable consumption. Empirical tests of consumption smoothing following from these theoretical models are very similar: in one way or another they envisage the estimation of the income elasticity of consumption.[17] The value of this parameter constitutes a test of the functioning of these markets or the presence of uninsurable risks. In the basic life cycle model used by Friedman a positive income elasticity implies the presence of unanticipated shocks which induce consumers to make adjustments in their life-time consumption plans. In the Arrow-Debreu economy, positive income elasticity implies the incompleteness of the market for state contingent assets so that when a household is confronted with a shock it must adjust its consumption accordingly. For the risk sharing model used by Townsend a positive parameter also

[17] The empirical models are estimated using various estimation strategies and include of course a range of control variables for demographic composition of households, regional diversity and time. For more information about the models we refer to the references mentioned in this section.

means that the insurance institutions cannot provide full insurance.[18] This literature is useful in the sense that it provides various models that give a rationale for consumption smoothing as well as the ways in which economic agents can smooth their consumption. However, as the empirical tests of the models discussed above are very similar, it does not make much sense to choose one these models to be an abstract representation for the Russian federation. The empirical test will not provide conclusive evidence in favour (or against) the theoretical model. Additionally, in reality households use a combination of various market and non market institutions, a point that is certainly valid for Russia, where market institutions are being developed. Thus, if the test suggests that households cannot fully smooth their consumption, it does not help us in finding out which institution fails. As the focus in this paper is on the overall ability of households to deal with income shocks, we decided to follow an exploratory approach.

5. Model of consumption smoothing: Error Correction Mechanism (ECM)

The innovative aspect of this study is that our model explicitly takes short and long run dynamics of the process of consumption smoothing into account; we investigate the ability of households to protect their consumption against income shocks using a dynamic panel analysis. A dynamic perspective is important because differences in the pre-shock level of household resources also influence the ability of households to protect themselves against income risks. Furthermore, short run consumption smoothing abilities may differ from long term consumption smoothing abilities. Finally, the economic, social and geographic diversity encountered in the Russian Federation makes it is relevant to take (un)observed heterogeneity between households into account. We therefore propose the following random effects panel model:

$$\Delta c_{i,t} = \alpha_0 + \alpha_1 c_{i,t-1} + \beta_1 \Delta y_{i,t} + \beta_2 y_{t,t-1} + \sum_{j=1}^{6} \gamma_j x_{j,i,t} ,+ \sum_{k=1}^{K} \delta_k D_k + v_i + \varepsilon_{i,t} \qquad 2$$

where, in addition to the change in expenditures and income ($\Delta c_{i,t}$ and $\Delta y_{i,t}$), the lag of income $y_{i,t-1}$ and expenditures $c_{i,t-1}$ are included. All income and expenditure variables are

[18] For instance, institutions in risk sharing communities are unable to insure against co-variant shocks. When the community is hit by such a shock households will have to adjust their consumption.

expressed in natural logarithms. Further, $x_{j,i,t-1}$ denotes the number of household members in the j^{th} age category[19], D_k represents a set of binary variables specifying each community separately by survey round, v_i is a random individual effect and $\varepsilon_{i,t}$ is the error term. β_1 is the short-run income elasticity of consumption and provides information about the question whether households are able to protect their income from short term fluctuations in their income. The effect of changes in household composition on consumption is assumed to be practically immediate.

The model specified above is an error correction mechanism (ECM). Assuming $\alpha_1 \neq 0$, the error correction representation of the model can also be written as

$$\Delta c_{i,t} = \alpha_0 + \beta_1 \Delta y_{i,t} + \alpha_1 (c_{i,t-1} - (-\frac{\beta_2}{\alpha_1} y_{t,t-1}) + \sum_{j=1}^{6} \gamma_j x_{j,i,t}, + \sum_{k=1}^{K} \delta_k D_k + v_i + \varepsilon_{i,t} \qquad 3$$

This specification reflects the idea of an intertemporal budget constraint; as the stock of wealth is limited, consumption can diverge from income for some time (i.e. due to an income shock). However, at some point, resources are depleted and consumption levels will have to adjust to (new) income levels. α_1 is the so-called equilibrium correction coefficient, which compensates for the short term overshooting or undershooting of consumption ($\alpha_1 < 0$); in case of a complete correction this parameter will have a value of -1. $(-\beta_2/\alpha_1)$ is the long term income elasticity of consumption; it is likely that the value of this parameter is higher than that of its short term counterpart because it is more difficult to smooth consumption over a longer period (assets or savings can be depleted; friends and family will stop assisting at some time). The application of an advanced panel model to measure consumption smoothing, and particularly the error correction interpretation of our model, constitute a contribution to the literature on consumption smoothing in various aspects. First, in comparison to the models used in the literature our model explicitly takes dynamics in consumption and income patterns and unobserved heterogeneity into account (Deaton, 1992, 1997; Ravallion & Chaudhuri, 1997; Skoufias, 2003; Townsend, 1994). Secondly, the error correction interpretation of our model is

[19] The demographic characteristics of household members are summarized in 6 variables, where each variable represents the number of household members in a particular age-gender category. These categories are children below age of 6, children aged between 6 and under 18, adult males, adult females, post-working age males (60 and above) and post working-age females (55 and above). The post-working categories are in accordance to the legal retirement age in Russia.

innovative in this application because it incorporates the idea that households are able to smooth consumption but in the long term income and expenditures should balance. As such it provides a more realistic representation of the determinants of consumption smoothing abilities.

The model thus allows us to assess the joint effect of short term consumption smoothing activities of households. Note, however, that the impact of income shocks such as shocks in labour supply in the household need not be fully reflected in changes in income because other household members may take up extra income generating activities as a response to the job loss of another member. Morduch (1995) classifies such responses as income smoothing. In the RLMS data it is difficult to distinguish between such income smoothing responses and normal income generating activities. There is also evidence that low wealth households in developing and transition economies smooth their consumption by means of other income smoothing strategies such as choosing crops with low variance yields or low risk-low return entrepreneurial activities. Our indicator of consumption smoothing ability does not capture the impact of such income smoothing channels. Another limitation of the analysis is that the model does not indicate at which cost consumption is smoothed. For example, households may accumulate non-productive assets that they can sell in times of trouble but this capital could have been used for investments (for example in human capital) with a higher expected return.

6. Estimation and specification

In the model outlined above, $c_{i,t-k}$ for any k is correlated with the unobserved household fixed effect, v_i. In order to obtain consistent estimates for this model a number of subsequent steps need to be taken. Firstly, rewrite equation 2 in levels.

$$c_{i,t} = \alpha_0 + (1+\alpha_1)c_{i,t-1} + \beta_1 y_{i,t} + (\beta_2 - \beta_1) y_{t,t-1} + \sum_{j=1}^{6} \gamma_j x_{j,i,t} ,+ \sum_{k=1}^{K} \delta_k D_k + v_i + \varepsilon_{i,t} \qquad 4$$

This model can be estimated using the Generalized Method of Moments (GMM) estimator. The GMM estimator yields consistent and more efficient estimators than other linear method of moments estimators (Arellano & Bond, 1991; Greene, 2003;

Wooldridge, 2001).[20] The efficiency increase results from the use of additional instruments (i.e. more instruments than needed for model identification) which become available when using the orthogonality conditions that exist between lagged values of the dependent variable, consumption, and the disturbances $\varepsilon_{i,t}$. Taking differences of equation 4 removes the household unobserved effects, v_i:

$$\Delta c_{i,t} = (1+\alpha_1)\Delta c_{i,t-1} + \beta_1 \Delta y_{i,t} + (\beta_2 - \beta_1)\Delta y_{t,t-1} + \sum_{j=1}^{6} \gamma_j \Delta x_{j,i,t} + \sum_{k=1}^{K} \delta_k \Delta D_k + \Delta \varepsilon_{i,t} \quad 5$$

The disturbance $\Delta\varepsilon_{i,t}$ follows an MA(1) meaning that the model is subject to first-order autocorrelation, though presumably not to any higher order of autocorrelation. In this model $\Delta c_{i,t-1}$ is still correlated with $\Delta\varepsilon_{i,t}$. However, $c_{i,t-2}$ is a valid instrument for $\Delta c_{i,t-1}$, for it is in principle not correlated with $\Delta\varepsilon_{i,t}$, and negatively correlated with $\Delta c_{i,t-1}$. At the number of time periods in the panel increases, more lags can be added as instruments.[21]

It is also important to consider the influence of possible measurement error in the income and expenditure variables on the model estimation. As with all household surveys, measurement error is inevitably present in the RLMS data. Different types of measurement error arise because of inconsistencies in the respondents' memories, deliberate underreporting of income, but also errors in for instance the imputations for home production. The dependent variable, household per capita expenditures, includes the value of home production consumed and the explanatory income variable includes the total value of home production. Deaton (1997) explains that in this type of specification, measurement error caused by imputations in home production can generate an upward bias when the coefficient is positive. To deal with this problem, Deaton suggests instrumenting the income and lagged expenditures variables; income is instrumented by the value of income minus the revenues from home production while the lagged expenditure variable is instrumented with expenditures minus the value of home

[20] Using an instrumental variable estimator is a consistent, albeit less efficient method.
[21] We have estimated this empirical model for the overall panel as well as for a number of subsamples using the Stata 9.0 software package. For the GMM estimator (level GMM) we have used the user-written program 'xtabond2' instead of Stata's 'xtabond' because 'xtabond2' provides more possibilities for the definition of the instrument matrix. 'xtabond2' is written by David Roodman, Center for Global Development, Washington, DC.

production consumed. We found evidence for this type of measurement error in the RLMS data and therefore used these instruments in our estimations.[22]

The aim of our analysis is exploratory; we estimate equation 5 not only for the overall sample but also for a selection of socio-economic groups in Russia.[23] These partial analyses allow us to gain insights in whether there are differences in consumption smoothing abilities between these subgroups. Furthermore in section 7 we use these results to study the relation between the degree of poverty risk for these socio-economic groups and their abilities of consumption smoothing. We estimate equation 5 for the following decompositions settlement type, household size, number of children, number of pensioners, household type and according to poverty characteristics (chronic poverty and average poverty ratio).

Table 6: Results overall and partial estimations for total expenditures

	$1+\alpha_1$	β_1	$\beta_2-\beta_1$	Hansen	AR(1)	AR(2)	Obs.
				(P-value)	(P-value)	(P-value)	
Overall	0.059***	0.160***	0.014	0.647	0.000	0.101	9,187
By: Settlement type							
Urban	0.080***	0.159***	0.014	0.321	0.000	0.043	5,742
Semi-urban	0.151	0.179**	-0.423	0.000	0.150	0.505	576
Rural	-0.004	0.150***	0.019	0.355	0.000	0.844	2,869

Notes: * 10%, ** 5% and *** 1% significance level. Two step GMM estimator including standard errors estimated with Windmeijer Finite Sample Correction (Windmeijer, 2005). Control variables included in estimation: changes in demographic composition and time-community dummies (at level of primary sampling unit).
Source: RLMS panel (measured at 2 year intervals from 1994 to 2004)

Table 6 reports the results for the main parameters (in reduced form), the specification tests and the number of observations for the full sample and the decomposition by settlement area. The demographic variables and time-community dummies that have been

[22] To test whether this type of measurement error is present in the RLMS data we estimated a simplified version of our model (excluding the lagged levels) using a 2SLS estimator with and without the instruments for income and expenditures. The estimated coefficients of the model using the instruments are indeed lower than those in the other model.
[23] We use the two step GMM estimator which includes a finite-sample correction to the two-step covariance matrix derived by Windmeijer (2005). This can make two step robust more efficient than the one step robust estimator. However, for some partial estimations this correction could not be estimated (matrix not positive definite). In these cases we have used the results from the robust one step GMM estimator.

included as control variables in the estimations are not reported in the tables. β_1 is the short run income elasticity of expenditures; thus a 10% decrease in income will only result in a 1.6% decrease in overall expenditures. This parameter can also be interpreted as an indicator for the short run ability of consumption smoothing: when it is close to zero, households are able to protect themselves against income shocks; when it is close to one, households do not (or are not capable) of consumption smoothing. A value between zero and one indicates partial consumption smoothing. β_1 is significant on a 1% level for the overall sample and the decompositions by settlement area; we can thus reject the null-hypothesis of perfect consumption smoothing. As the short term elasticities also differ significantly from one (not shown here), our results therefore provide evidence of partial consumption smoothing (Skoufias, 2003; Townsend, 1994). The other parameters of the error correction model are not estimated directly but are reported in the appendix (Table 10). Although the parameters for lagged consumption ($1+\alpha_1$) and lagged income ($\beta_2-\beta_1$) are only significant for some subsamples, the parameters of interest (α_1 and $-\beta_2/\alpha_1$) differ significantly from zero.[24] The value of α_1, the error-correction coefficient, is expected to be negative because of the need to compensate for under- and over-consumption in previous periods. A value of $\alpha_1 = -1$ indicates immediate adjustment to disequilibrium. Table 10 shows that the estimated error correction parameters are close to minus one. $-\beta_2/\alpha_1$ represents the long term income elasticity of consumption; in line with our expectations we find that the estimated long term income elasticities are higher than their short term counterparts indicating that it is harder to smooth consumption over a longer period.[25]

We also performed a number of tests to evaluate the validity of the model specification. First, a consistent GMM estimator requires that there is no second-order autocorrelation, thus that $E(\Delta\varepsilon_{i,t} \times \Delta\varepsilon_{i,t-2}) = 0$.[26] It is also important to check whether the residuals actually display first-order autocorrelation or whether they follow a random walk. The test

[24] The standard error of the long term elasticity ($-\beta_2/\alpha_1$) is estimated using the delta method. The standard error of the error correction term (α_1) can easily be obtained by testing the hypothesis that ($1+\alpha_1$) = 1 which is mathematically equivalent to testing that $\alpha_1 = 0$.
[25] Note that the size of the estimated parameters is sensitive to the choice of time period; including more or fewer survey rounds will change the estimates. It also cannot be excluded that these results may, to some degree, suffer from attenuation bias caused by uncontrolled heterogeneity or other measurement error.
[26] Testing this condition requires a number of time periods $T \geq 5$ (Baltagi, 2001).

statistics for the estimated sub samples reported in Table 6 and Table 10 confirm that these assumptions on the model are acceptable in most cases.[27] The Hansen test evaluates the validity of the over-identifying restrictions used in the GMM estimator. A failure to reject the null-hypothesis indicates that there is no violation of the zero correlation assumption between additional instruments and the error term. The null-hypothesis cannot be rejected for the overall sample as well as for most of partial estimations.[28] [29]

7. Consumption smoothing abilities and poverty risk: discussion

The results in the previous section show that a dynamic specification of households' consumption smoothing behaviour is appropriate. The other key result is that households are indeed able to protect their consumption partially from income shocks. We now focus on the short-term ability of households to smooth consumption during the transition period. This ability reflects an important dimension of welfare, namely the capacity of households to maintain their standard of living in an uncertain environment. It is important to remind that β_1 represents the outcome of a mix of consumption smoothing strategies; it does not only reflect self-insurance strategies such as borrowing and selling assets, but also all formal and informal risk sharing arrangements that spread the effects of income shocks across households at any point in time. We are further interested in the manner in which consumption smoothing abilities are related to poverty risk; do households with a higher poverty risk also have more difficulties with consumption smoothing? From the development literature we know that poor households have fewer assets and are more likely to face borrowing constraints (Bardhan & Udry, 1999; Deaton, 1997). But such households might alternatively make use of other consumption smoothing strategies such as risk sharing arrangements. By comparing the results of the

[27] The AR(1) test only finds no evidence of first order autocorrelation for the two household types (Single adult and kids and the triple generations household). The AR(2) test fails to reject the zero second order correlation at a 1% level for the Adult couple with no kids and at a 5% level for the urban sub sample.
[28] Only for the semi-urban sub sample and for households with two or more pensioners the null hypothesis can be rejected.
[29] Not reported here are the results of the Hausman model specification test that provides information on how the income variables should be treated, i.e., as predetermined or endogenous (Hausman, 1978). The Hausman test is a test of endogeneity based upon a direct comparison of coefficient values. The test indicated that income can be treated as exogenous.

poverty analysis with the short run smoothing abilities of household estimated in the partial analyses we want to get some preliminary insights into the relationship between poverty risk, poverty duration and consumption smoothing ability. At the end of this section we also compare our results those of Skoufias (2003) who estimated households' consumption smoothing abilities with the RLMS data but using a differenced model instead of a dynamic specification.

Table 8 and
Table 7 summarize the consumption smoothing abilities for the overall sample and the decomposition by household's social-economic characteristics (the β_1's of the partial analyses); a high consumption smoothing ability is reflected by low income elasticity, β_1. We also estimated the model separately using either food expenditures or non-food expenditures as independent variable.[30] The reason for making this distinction between expenditure categories is that the previous section showed that households only partially smooth consumption. Partial smoothing thereby also implies a choice about which expenditures to smooth and which not. The results show that the short term income elasticity of food expenditures is considerably lower than that of non-food expenditures and that this is the case for all partial estimations; households smooth their food consumption better than their non-food consumption. This result makes sense intuitively; when households are unable to fully protect their consumption from an income shock, they prefer to cut expenditures of less essential items instead of cutting on food items. The motivation for such choice is explained by Maslow's theory of needs (1987) which distinguishes between basic needs and higher needs such as love/belonging, esteem and self actualisation. Once basic needs are satisfied, individuals will seek to fulfil their higher needs. However, when basic needs are not met, individuals will prioritize the satisfaction of those needs. When resources are even more limited, it may be necessary to

[30] From an econometric perspective this actually implies that the model with total expenditures is not adequate when the estimated parameters of food and non-food expenditures are different. Given the exploratory character of this analysis we decided to report the short term elasticities for total, food and non-food expenditures. The specification tests using food and non-food expenditures do not vary much with those obtained using total expenditures.

choose which (basic) needs are most important.[31] In this respect, households' expenditures are a reflection of their efforts to satisfy their needs. Expenditures on items such as food, shelter and clothing are typically associated with basic needs. The difference between food and non food smoothing abilities may thus reflect a prioritization of households' (basic) needs with food expenditures receiving priority above non-food expenditures.

Table 7: Short-run consumption smoothing abilities by poverty characteristics

	Total expenditures	Food expenditures	Non-food expenditures
Overall	0.160***	0.120***	0.366***
By: Average poverty ratio			
≤ PL[1]	0.160***	0.182***	0.248
> PL≤1.5PL[1]	0.134***	0.091**	0.561***
>1.5PL≤2PL[1]	0.160***	0.086**	0.415***
>2 PL ≤2.5PL[1]	0.211***	0.179***	0.307**
≥2.5PL[1]	0.154***	0.114***	0.266***
By: Chronic poverty groups			
Chronic poor[1]	0.160***	0.182***	0.248
Occasionally poor	0.188***	0.150***	0.436***
Never poor	0.115***	0.068***	0.255***

Notes: [1] One step GMM. * 10%, ** 5% and *** 1% significance level.
Source: RLMS panel (measured at 2 year intervals from 1994 to 2004)

At the same time, Table 8 and

Table 7 also show that consumption smoothing abilities vary according to households' long-term living standard and socio-economic characteristics. We proceed by discussing the smoothing results by decomposition and discuss to what way the smoothing abilities of particular household characteristics may be related to our findings in terms of poverty risk and long term poverty (

Table 4 and Table 5). We start with the long term welfare indicators and decompose the sample according to the average poverty ratio and our indicator of chronic poverty. The average poverty ratio shows the distance of the average living standard of the household relative to its household specific poverty line while the chronic poverty groups are a combination of the frequency of poverty spells experienced and the average living standard with respect to the poverty line (note that the first average poverty ratio group (≤

[31] Maslow postulated that there is a particular hierarchy in these needs. What is of relevance for our discussion is the notion that individuals prioritize needs and distinguish between more and less essential needs (essential in terms of survival).

PL) is the same as the chronic poor). The decompositions of the average poverty ratio groups allow us to investigate how consumption smoothing abilities vary as the average living standard of a household increases (i.e. whether the average level of well-being plays a role). Patterns in smoothing abilities by chronic poverty groups are interesting because smoothing abilities may also be related to the experience of poverty or not (i.e. whether the occasional or chronic experience of absolute poverty plays a role).

Table 7 shows that non-food expenditure smoothing abilities increase (i.e. β_1 decreases) as household's average living standard rises. However, the income elasticity of the group with the lowest living standard (i.e. the chronically poor) does not differ significantly from zero suggesting that this group has the highest non-food smoothing ability. It seems that this group cuts predominantly food expenditures when faced with an income shock (chronically poor have the lowest food smoothing ability of all groups). Food smoothing abilities follow a wave pattern, with chronically poor having the lowest smoothing abilities, households just above the poverty line having the highest food smoothing ability, followed by lower food smoothing abilities for the next group (>2 PL ≤2.5PL) and higher abilities for the wealthiest group (≥2.5PL). Again Maslow's theory provides clues for a possible interpretation for these patterns. The chronically poor face a continuous struggle to meet basic needs. As such they spend all available resources on the satisfaction of those basic needs; of which a large share is spent on food.[32] Those remaining expenditures on non-food items also reflect essential expenditures to satisfy the bare minimum of other basic needs (shelter, heating/utilities, clothing/shoes and transport). When resources are so low, further cutting non-food expenditures after an income shock would mean not having a roof above your head, not being able to prepare your food or not going to work anymore. (Further) cutting expenditures on food may then be the only feasible alternative. Groups with a higher average living standard can choose to cut expenditures in other categories if they cannot fully smooth the income shock; those households just above the poverty line cut expenditures on less essential non-food items while better off households may prefer to cut less essential food expenditures

[32] Indeed, the per capita share of food expenditures is highest for chronic poor households and lowest for households that did not experience poverty in the observed period. In 2004, the average food share was 61% for chronic poor households, 58% for occasional poor households and 55% for the other households.

(cheaper products, less luxury food stuffs) and/or other items (buy fewer (designer) clothes, one holiday less).

The decomposition by chronic poverty groups additionally suggests that household who experienced a temporary drop of living standard below the absolute poverty line make the largest expenditure adjustments, both in food and non food items. Households that never experienced poverty, are better able to protect themselves against income shocks (especially food expenditures are well protected). It is not clear to what extent these differences in smoothing abilities are the result of differences in the available means to smooth consumption (i.e. chronic and occasionally poor groups have fewer smoothing possibilities) and/or differences in the magnitude of income shocks (i.e. the occasionally poor experiencing more severe shocks). Concluding, both longitudinal decompositions show that consumption smoothing abilities improve as the living standard increases. Furthermore, finding that chronically poor households also seem to be able to partially smooth consumption is not reassuring; the uninsured part of the shock affects expenditures on food (with potentially long-term consequences on health) and the cost of the smoothed part of the income shock may be very high and further limit the opportunities for future improvements in living standards.

We proceed by comparing households' consumption smoothing abilities with the poverty risk for a range of socio-economic characteristics. The decomposition of the full sample into rural and (semi-)urban settlement areas for total household expenditures suggests that rural households are somewhat more capable to protect their overall consumption against income shocks than urban households. When decomposing expenditures into food and non-food expenditures, rural households appear to be quite able to smooth food expenditures but have a much lower ability to protect their non-food expenditures. The poverty profile in
Table 4 shows that households in rural areas have a higher poverty risk. A likely explanation for this difference is that rural households have higher food smoothing abilities because they have more opportunities to produce their own food and make use of

these opportunities.[33] In Notten (2007) is shown that rural households are indeed more likely to produce their own food and that home produced food constitutes a large share of total household income. It is also shown that households themselves consume large parts of this home produced food. Households in urban areas are more dependent on the proceeds from cash income generating activities than rural households, which renders them more vulnerable to income shocks in general; the poverty analysis showed that during the 1998 crisis the number of poor urban households roughly tripled while the number of poor rural households doubled. At the same time, it seems that the urban environment provides more opportunities in terms of employment and entrepreneurship for making a decent living (above the poverty line) and to accumulate savings or other assets that can be used in difficult times.

Table 8: Short-run consumption smoothing abilities by household characteristics

	Total expenditures	**Food expenditures**	**Non-food expenditures**
Overall	0.160***	0.120***	0.366***
By: Settlement type			
Urban	0.159***	0.127***	0.304***
Semi urban	0.179**	0.074	0.327*
Rural	0.150***	0.100***	0.519***
By: Household size			
1	0.086*	0.065	0.456***
2	0.203***	0.141***	0.409***
3	0.158***	0.122***	0.289***
≥4	0.191***	0.141***	0.370***
By: # of children			
0	0.141***	0.110***	0.361***
1	0.191***	0.155***	0.300***
≥2	0.200***	0.112***	0.526***
By: # of pensioners			
0	0.204***	0.140***	0.400***
1	0.107***	0.102***	0.440***
≥2	0.111*	0.077	0.283***
By: Household type			
Single adult[1]	0.264**	0.131	-0.145
Single pensioner[1]	0.052	0.018	0.538***
Adult couple no kids[1]	0.276***	0.178***	0.457***.
Elderly couple[2]	0.198***	0.157***	0.408***
Single adult & kids (<18)[1]	0.207***	0.048	0.449***
Adult couple & kids (<18)	0.199***	0.087***	0.430***

[33] Remember that the value of home produced food is included in the income variable and that the value of consumption of home produced goods is included in the expenditure variables.

Triple generations household	0.200	0.128	0.244*
Other households with pensioners	0.120*	0.172**	0.229
Other households	0.185***	0.159***	0.306***

Notes: [1] One step GMM. [2] Household with at least 1 pensioner.
*10%, ** 5% and *** 1% significance level.
Source: RLMS panel (measured at 2 year intervals from 1994 to 2004)

The decomposition of the sample according to the number of household members shows that 'single person' households have a higher smoothing ability in terms of food expenditures but the lowest ability in terms of non-food expenditures as compared to larger households. There is no clear pattern in smoothing abilities as the number of household members rises; the decompositions of the overall sample with respect to children, elderly and household types discussed below suggest that the observed pattern may be related to the structure of the household (dependency ratios) and eligibility to old age pensions.

Firstly, having an elderly as household member increases the ability of consumption smoothing in terms of total and food expenditures but only enhances smoothing abilities for non-food expenditures if there is more than one elderly living in the household. According to the poverty profile, households comprised of only elderly persons or at least including 2 elderly persons have lower poverty rates of this category. Every elderly citizen in the Russian Federation is entitled to a pension (the eligible age is 55 for women and 60 for men). This pension consists of a basic amount plus increments depending on the employment record but in reality the amounts of pension received did not differ widely during the transition period (Social Security Association, 2002; Zurabov, July 2002).[34] In this respect, one hypothesis is pensions in Russia are typically sufficient to lift elderly out of poverty and even allow them to accumulate some assets (savings) which can be used as a consumption smoothing strategy. However, this is only partially true as the high inflation during the economic crisis of 1998 eroded the real value of pensions. The poverty profile shows a clear jump in elderly poverty rates during this time. The old age pension might be sufficient for maintaining a welfare level above the poverty line,

[34] As a result of the pension reform in 2001 it can be expected that this discrepancy will increase in the coming years.

but when the real value of pension declines (as it did in 1998) expenditures have to be cut. Additionally, the decomposition by household type shows that the demographic structure of pensioner households is relevant; single elderly households and triple generation households have high abilities of smoothing food expenditures while the other pensioner households type smoothes predominantly through non-food expenditures.

Looking at the decomposition by household types we can further see that households with children and single person households have higher than average food smoothing abilities while households without children and consisting of two or more members have lower than average food smoothing abilities. However, the correspondence between poverty risk and food/non-food smoothing abilities of these household characteristics is not so clear. Generally, we observe that as the number of children in a household increases, the poverty risk also increases while the overall consumption smoothing ability is lower than that of households with no children. However, the decomposition by household types shows that the demographic structure of households with children matters a lot for poverty risk as well as non-food smoothing abilities; single parent households have a high poverty risk and well below average non-food smoothing abilities, extended households also have a somewhat higher poverty risk but below average non-food smoothing abilities while households consisting of two adults and children have a below average poverty risk and above average non-food smoothing ability. These differences are likely to be the result of a combination of factors we already discussed (the typical living standard of such household types, eligibility to an old pension and perhaps also rural/urban settlement area) and varying dependency ratios. Households with children in general, but especially single parent households, extended family households and households with several children have higher dependency ratios; there are fewer economically active adult(s) who have to make a living for themselves and their dependent family members. A higher dependency ratio thus increases the risk of poverty. However, inactive (adult) household members may facilitate labour participation of other household members but can also contribute to household (food) production or households' income by receiving a pension. These effects are likely to contribute to the

poverty risk and consumption smoothing abilities of households consisting of several adults while they are out of reach for single parent households.

We now shortly compare our results with a paper that has been an important source of inspiration for this research. In his paper titled *Consumption Smoothing in Russia*, Emmanuel Skoufias (2003) also estimated household's response to income shocks. Skoufias used a differenced model which related changes in income to changes in consumption and was estimated by pooled Ordinary Least Squares (OLS) using RLMS 1994 to 2000.[35] In broad lines the results of both studies are comparable; Skoufias finds that households are only partially insured against income shocks and that food expenditure are better protected than non-food expenditures. We argued, however, that a dynamic specification is more appropriate in a theoretical sense because households' abilities to smooth consumption in the short run are also determined by a long term relation between income levels and consumption levels. Our empirical results further support the appropriateness of a dynamic specification. Unfortunately, the short run income elasticities in both studies are not directly comparable due to other methodological differences.[36] A comparison of determinants for differences in smoothing abilities suggest further differences; Skoufias finds that rural households and households with children have higher consumption smoothing abilities whereas we find the opposite result. It is likely that these differences arise due to measurement error caused by imputations in home production; estimates of our model without instrumenting the home production component resulted in similar outcomes for rural households and households with children as Skoufias' results. As mentioned before, this type of measurement error can generate an upward bias when the coefficient is positive. It is not surprising that this

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[35] Skoufias estimated the following model $\Delta c_{i,t} = \alpha_0 + \beta_1 \Delta y_{i,t} + \sum_{j=1}^{J} \gamma_j x_{j,i,t} + \sum_{k=1}^{K} \delta_k D_{k,t} + \Delta \varepsilon_{i,t}$

where $\Delta c_{i,t}$ represents the change in natural logarithm of total consumption for household i, in period t, $\Delta y_{i,t}$ represents the change in natural logarithm of total household income, $x_{j,i,t}$ is a particular household characteristic, such as family size and demographic composition, $D_{k,t}$ is a binary variable specifying each community separately by survey round, and $\varepsilon_{i,t}$ is a random error term.

[36] Skoufias uses a shorter time period (1994-2000), uneven time intervals (because of missing surveys in 1997 and 1999) and does not correct for measurement errors in home production. We estimated our model for a shorter time period which resulted in higher short run income elasticities (as compared to our current results). Taking unevenly spaced time intervals also increases the short run income elasticities. Not instrumenting home production also results in higher elasticities.

type of measurement error has a large impact on rural households (rural household tend to have more children as well).

8. Conclusion

In this paper we examined the extent to which Russian households have been able to protect their consumption against income shocks during the transition period and how the households' consumption smoothing abilities are related to the risk of poverty. We used cross-section data to estimate the (absolute) poverty profile in transition Russia and panel data to describe the longitudinal characteristics of poverty. An innovative aspect of the study is that we modeled households' consumption smoothing behavior by an Error Correction Mechanism (ECM), distinguishing between short term and long term smoothing dynamics. We estimated a reduced form of this model using Generalized Method of Moments (GMM) techniques. To study heterogeneity in consumption smoothing abilities and its relation to poverty risk, we followed an exploratory approach and estimated the described model not only for the complete sample but also for various socio-economic subgroups in the population. Empirical analyses of consumption smoothing behaviour have often been based on differenced data in order to eliminate individual household effects. However, such specification fails to incorporate long term effects, which are also likely to influence short run smoothing abilities. The error correction mechanism underlines the special relationship of income and expenditures; expenditures can deviate from income in the short term but, in the long term, income and expenditures should balance. The results from the specification tests indicate that our model does not violate the assumptions required for estimation.

We find that Russian households are partially able to smooth expenditures in the short run and that food expenditures are better protected than non-food expenditures. The partial estimations according to various levels of average living standards and chronic poverty groups show that consumption smoothing abilities improve as the living standard increases. Although chronically poor households are partially able to protect their consumption from income shocks, at the same time, they respond by further reducing already low levels food expenditures. Occasionally poor households are found to have the lowest consumption smoothing abilities. However, low abilities of consumption smoothing are not always associated with high poverty risk. For instance, we find that

rural households, who have a high poverty risk, manage to smooth food expenditures quite well, most likely because they have more opportunities to produce their own food. But households with pensioners, who have a lower poverty risk, have higher consumption smoothing abilities.

These results support the arguments of scholars such as De Neubourg and Holzman who propose a new orientation of social protection policies; such policies should not only focus on basic poverty relief but there is also an important role for the government in terms of assisting households managing risks (Holzman & Jorgensen, February 2000; Neubourg de & Weigand, 2000). Social insurance programs can play an important role in this respect; our findings suggest that elderly household members in Russia reduce the risk of poverty and enhance consumption smoothing abilities. However, the scope of policies improving households' consumption smoothing abilities extends beyond that of social protection policies. Rural development policies such as investments in infrastructure may simultaneously reduce the poverty risk of such households and improve their (non food) consumption smoothing abilities because of improved possibilities of generating (cash) income. Furthermore, governments play an important role in market economies and can exercise a positive or negative influence on macroeconomic stability and on the labour market (thus affecting the sources of uncertainty in the household environment). We discussed how the transition to a market-based economy exposed households to a series of aggregate shocks. Governments can reduce the likelihood of such shocks by means of legislation, monitoring and evaluation. At the same time, better functioning financial markets also allow households to use markets to protect themselves against risks through lending, saving and insurance products.

We have provided a number of intuitively appealing explanations for our results but further research is required to understand the underlying determinants of poverty risk and consumption smoothing abilities. Firstly, our partial analyses are only of an exploratory nature. It is preferable that the influence of household characteristics is directly incorporated in a model of consumption smoothing. Secondly, research into the specific

smoothing strategies followed by households and the institutions which assist them with smoothing is needed. Such analysis would also yield more concrete policy recommendations. Thirdly, it should also be noted that we have thus far analysed the impact of income shocks on consumption. Households may also pursue income smoothing strategies instead of consumption smoothing (Morduch, 1994, 1995).

Annex I: Comparison cross-section and panel dimensions RLMS

The RLMS is a sample of dwelling places, which means that when a household moves, it is removed from the cross-section dimension. However, once moved, the RLMS tried to locate these households and remained interviewing them for the panel dimension (this strategy has been implemented since round 7). This explains why the size of panel increases over time. New households that moved into a sampled dwelling place were added to the cross-section. Also note that each sampled dwelling place was visited every round; even if a household refused to cooperate or was not present in one round, the household was visited again in the subsequent survey round. Thus, for round 5 (the first round of wave 2), all households in the panel are also part of the cross-section. We have included households in the panel once they have been observed for at least three consecutive periods (two-year periods in this case). For example, a household is part of the panel when it is observed in 1994, 1996 and 1998 but also when it is observed in 1996, 1998, 2000 and 2002.

Comparison of the characteristics of the weighted cross-sections with the unbalanced panel reveals a number of differences.[37] Rural households are overrepresented in the panel in comparison to the cross-section. An important factor for this difference is higher attrition rate of households in Moscow and Saint Petersburg. For this reason the RLMS included a new sample of households from these areas in 2001. Single households and childless households are somewhat underrepresented in the panel. Median income and

[37] Note that we have used the yearly adjusted household post-stratification weights computed by the RLMS for the cross-sections. These weights attempt to match certain demographic characteristics of the sample to those observed in the 1989 census. The household-level weights adjust for household size and urban-rural residence. There are no such weights available for the panel dimension.

expenditures are slightly lower in the panel while the differences for the averages are somewhat larger albeit in the same direction.

Table 9: Attrition effects in RLMS: comparison characteristics cross-section and panel

Year (survey round)	1994 (5)		1996 (7)		1998 (8)		2000 (9)		2002 (11)		2004 (13)	
	C*	P**	C	P	C	P	C	P	C	P	C	P
Observations	3,586	2,339	3,234	2,610	3,108	2,956	3,015	3,120	3,132	2,919	3,052	2,625
Settlement type (%)												
Urban	69.6	63.7	67.0	63.6	66.7	65.1	65.7	63.9	67.9	63.9	64.6	62.8
Semi-urban	5.5	5.7	5.8	6.2	5.7	6.1	6.5	6.6	5.7	6.6	5.3	6.6
Rural	24.9	30,6	27.2	30.2	27.7	28.9	27.8	29.5	26.4	29.5	30.1	30.6
# of children (%)												
0	53.2	50.2	53.8	50.6	54.6	52.6	55.2	53.1	57.0	56.2	61.5	59.7
1	26.1	25.5	26.0	26.7	26.8	27.4	28.0	29.6	28.1	28.7	25.9	26.7
≥2	20.9	24.3	20.3	22.7	18,7	20.1	16.8	17.3	14.9	15.2	12.6	13.6
# of pensioners (%)												
0	53.7	52.0	52.7	51.8	51.2	51.5	51.8	50.8	51.1	50.8	49.9	49.6
1	30.2	30.2	31.3	31.3	32.1	31.8	31.9	32.1	32.9	32.1	34.8	33.9
≥2	16.1	17.8	16.0	16.9	16.7	16.8	16.3	17.0	16.0	17.0	15.4	16.5
Household size (%)												
1	17.2	14.2	18.3	15.4	18.7	16.7	19.8	17.2	20.4	18.6	23.1	20.0
2	28.7	28.4	27.6	27.1	28.1	27.9	28.0	28.9	27.9	29.0	28.2	28.8
3	23.2	22.9	22.6	23.6	22.8	23.9	22.1	25.1	22.1	24.7	23.6	25.2
≥4	30.8	34.5	31.5	33.9	30.4	31.5	30.2	28.9	29.6	27.6	25.0	26.0
Per capita real income												
Median	2,087	2,046	1,504	1,457	1,241	1,250	1,416	1,421	2,014	1,950	2,306	2,218
Mean	2,754	2,648	2,064	1,926	1,607	1,563	1,899	1,858	2,749	2,436	2,938	2,763
Per capita real expenditures												
Median	2,631	2,590	2,026	1,942	1,494	1,461	2,096	1,783	2,222	2,106	2,419	2,248
Mean	3,767	3,484	2,947	2,713	2,162	2,056	2,528	2,483	2,942	2,823	3,270	2,982

Notes: * C= Cross-section (unweighted) ** P = Observations in panel comprising of households that are at least observed 3 consecutive times.
Source: RLMS panel (measured at 2 year intervals from 1994 to 2004)

Annex II: Estimations error correction coefficients and specification tests

Table 10: Results overall and partial estimations by household characteristics

	α_1	β_1	$-\beta_2/\alpha_1$	Hansen (P-value)	AR(1) (P-value)	AR(2) (P-value)	Obs.
Overall	-0.941***	0.160***	0.185***	0.647	0.000	0.101	9,187
By: Settlement type							
Urban	-0.920***	0.159***	0.188***	0.321	0.000	0.043	5,742
Semi-urban	-0.849***	0.179**	-0.287	0.000	0.150	0.505	576
Rural	-1.004***	0.150***	0.168***	0.355	0.000	0.844	2,869
By: Household size							
1	-1.004***	0.086*	0.097	0.453	0.000	0.064	1,716
2	-0.948***	0.203***	0.228***	0.132	0.000	0.593	2,654
3	-0.968***	0.158***	0.180***	0.818	0.000	0.185	2,179
≥4	-0.888***	0.191***	0.238***	0.518	0.000	0.740	2,638
By: # of children							
0	-0.958***	0.141***	0.148***	0.462	0.000	0.307	5,279
1	-0.948***	0.191***	0.262***	0.219	0.000	0.549	2,405
≥2	-0.846***	0.200***	0.242***	0.132	0.000	0.428	1,503
By: # of pensioners							
0	-0.900***	0.204***	0.241***	0.390	0.000	0.406	4,460
1	-1.003***	0.107***	0.140***	0.948	0.000	0.522	3,089
≥2	-0.896***	0.111*	0.100	0.015	0.000	0.450	1,638

Notes: * 10%, ** 5% and *** 1% significance level. The null-hypothesis that the structural parameter is equal to zero. The standard error of the long term elasticity is estimated using the delta method. Two step GMM estimator with robust standard errors (Windmeijer, 2005). Control variables included in estimation: changes in demographic composition and time-community dummies (at level of primary sampling unit).
Source: RLMS panel (measured at 2 year intervals from 1994 to 2004)

Table 10 continued: Results overall and partial estimations by household characteristics

	α_1	β_1	$-\beta_2/\alpha_1$	Hansen (P-value)	AR(1) (P-value)	AR(2) (P-value)	Obs.
By: Household type							
Single adult (1 step)	-1.128***	0.264**	0.233	1.000	0.004	0.082	247
Single pensioner (1 step)	-1.350***	0.052	0.054	0.878	0.000	0.344	1,469
Adult couple no kids (1 step)	-1.012***	0.276***	0.424***	1.000	0.002	0.001	645
Elderly couple (≥1 pensioner)	-0.975***	0.198***	0.223**	0.153	0.000	0.541	1,486
Single adult & kids (<18) (1 step)	-1.026***	0.207***	0.139*	1.000	0.177	0.050	323
Adult couple & kids (<18)	-0.872***	0.199***	0.289***	0.336	0.000	0.950	1,721
Triple generations household	-1.001***	0.200	0.275*	0.899	0.849	0.737	897
Other households with pensioners	-0.857***	0.120*	0.049	0.050	0.013	0.064	475
Other households	-0.893***	0.185***	0.187***	0.592	0.000	0.665	1,524
By: Average poverty ratio							
≤ PL (1 step)	-0.990***	0.160***	0.185*	1.000	0.000	0.702	675
> PL≤1.5PL(1 step)	-0.935***	0.134***	0.106	0.566	0.000	0.899	1,439
>1.5PL≤2PL(1 step)	-1.020***	0.160***	0.166***	0.953	0.000	0.188	1,561
>2 PL ≤2.5PL(1 step)	-0.977***	0.211***	0.282***	0.500	0.000	0.701	1,672
≥2.5PL(1 step)	-0.916***	0.154***	0.189***	0.755	0.000	0.192	3840
By: Chronic poverty groups							
Chronic poor (1 step)	-0.990***	0.160***	0.185*	1.000	0.000	0.702	675
Occasionally poor	-0.966***	0.188***	0.206***	0.483	0.000	0.181	4,008
Never poor	-0.955***	0.115***	0.152***	0.536	0.000	0.527	4,504

Notes: * 10%, ** 5% and *** 1% significance level. The null-hypothesis that the structural parameter is equal to zero. The standard error of the long term elasticity is estimated using the delta method. Two step GMM estimator with robust standard errors (Windmeijer, 2005). Control variables included in estimation: changes in demographic composition and time-community dummies (at level of primary sampling unit).
Source: RLMS panel (measured at 2 year intervals from 1994 to 2004)

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