Poverty and Consumption Insurance in Russia

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Abstract

The transition to a market economy has required all the resourcefulness of the Russian people in order to make ends meet. This paper investigates to what extent Russian households have been able to insure their consumption against income shocks and how this ability of consumption smoothing is reflected in terms of consumption poverty statistics. For my analysis I use data from the Russian Longitudinal Monitoring Survey (RLMS) from 1994 to 2001. The degree of consumption insurance is investigated using a dynamic panel analysis. The error correction model estimates show that households can only partially insure themselves to income shocks and that the degree of insurance varies according to household characteristics. Comparison of poverty statistics with the insurance indicator show that higher degrees of consumption insurance are not always accompanied by lower poverty rates and vice versa. Households in urban areas are more vulnerable to income shocks but have disproportionately lower poverty rates. These results provide a rationale for policies that are not only oriented at poverty relief but also at the assistance of households with their risk management.

1 Introduction[1]

During the last decade, the Russian Federation experienced that the transition from a central planned economy to a capitalist economy is full of bumps, potholes and off the road experiences. For the Russian people, the transition process involved a surge in uncertainty (World Bank, 1999). Unemployment was essentially an unknown phenomenon in pre-transition Russia. The closing down or privatisation of the large public industrial and agricultural enterprises 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 goods resulted in an increase of the cost of living. Additionally, in order to make a living in this new market economy, other skills and abilities were required.

[1]Part of this paper are based on a joint econometric exercise undertaken by the Britta Augsburg, Dion Bongaerts, Ron Jongen, Ewa Slowinska and the author. They deserve credit, as their contributions to the model specification and estimation process have been very important in shaping sections 4 and 6 of this paper. I would also like to thank my colleagues Sybrand Schim van der Loeff and Denis de Crombrugghe for their suggestions with respect to the model specification in this paper.

The transition phase has required all the resourcefulness of the Russian people in order to make ends meet. This paper investigates to what extent Russian households have been able to insure their consumption against income shocks during this period and how this ability of consumption smoothing is reflected in terms of consumption poverty statistics. This topic is relevant as poverty and the ability of consumption insurance are each reflecting a different dimension of welfare. Consumption poverty statistics describe the level of welfare enjoyed by households in terms of consumption thereby using household's expenditures at a particular point in time as a welfare indicator. The ability of consumption insurance reflects the extent to which households are capable of maintaining stability in consumption over time. For the analysis I use the cross-section and panel data from the Russian Longitudinal Monitoring Survey (RLMS) from 1994 to 2001.

This paper is organized as follows; section 2 describes the main developments of the Russian economy and also reports the results of a poverty analysis performed by the author. In section 3, I discuss the relevance and background of consumption insurance, which is followed by the model specification in section 4. In section 5 the RLMS data are described and section 6 explains the followed estimation strategy. Section 7 discusses the results followed by the conclusion in section 8.

2 Russia in transition

The first stage of the transition from a central 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 1 reports a number of macroeconomic indicators that reflect this trend. Annual GDP growth has been negative from 1990 until 1996 with a peak shrinking of 14.5% in 1992. 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 (Milanovic, 1998; World Bank 1995, 1998; Commander et al, 1999). 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; Sapit, 1999 and Slay, 1999). From 1999 on, a period of sustained recovery followed, reaching positive GDP growth rates with a peak of 9% in 2000. The sustained increase of unemployment rates from 1992 to 1999 mainly reflects the process of structural change in the Russian economy but also the impact of the economic crisis (in 1998 and 1999). Other indicators for the structural changes in the economy during the transition phase are the employment shares in different sectors of the economy; from 1989 on 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.[2]

The impact of the transition phase on the Russian population can also be expressed in terms of poverty. I have analyzed trends in poverty using data from the Russian Longitudinal Monitoring Survey (RLMS).[3] Section 5 provides a more detailed explanation of the RLMS data. For the poverty

[2] 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.

[3] This information is provided on the website of the RLMS: http://www.cpc.unc.edu/projects/rlms/home.html. The website gives more detailed information on the RLMS project.

Table 1: Macro-economic indicators

	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01
GDP growth (%)	1.9	-3.0	-5.0	-14.6	-8.6	-12.6	-4.1	-3.4	0.9	-4.9	5.4	9.0	5.0
GDP deflator	0.01	0.02	0.04	0.57	5.65	23.0	60.6	87.4	100	116	192	270	318
C.P.I.	n.a.*	n.a.	n.a.	0.85	8.25	33.6	100	148	110	216	402	485	590
Unemployment (%)	n.a.	n.a.	n.a.	5.2	5.9	8.1	9.5	9.7	11.8	13.3	13.4	11.4	n.a.
Employment (%)													
Agriculture	n.a.	13.9	14.2	15.4	15.5	16.1	15.7	15.3	12.2	11.5	11.8	n.a.	n.a.
Industry	n.a.	40.1	39.7	38.6	38.0	35.9	34.0	32.5	30.0	29.4	29.4	n.a.	n.a.
Services	n.a.	41.0	41.5	41.2	46.1	47.7	50.0	52.2	57.8	59.1	58.8	n.a.	n.a.
* Not available (n.a.)													
Source: World Development Indicators													

analysis I have used data from the cross-section component of second phase of the RLMS project for the years 1994, 1995, 1996, 1998, 2000 and 2001 (rounds 5 to10).[4][5] The RLMS has constructed a number of economic variables including household expenditures and poverty lines. The poverty lines are based on regional age-gender specific food-baskets that are valued at regional prices. These poverty lines were calculated for each household and depend on the demographic composition of the household. I use the constructed variable of total household expenditures as the welfare indicator. This variable is composed of cash and the monetary value of non cash expenditures on a wide range of expenditure categories.[6][7]

I have computed the aggregate poverty indices and poverty profiles using the Foster Greer Thorbecke class of decomposable poverty indices (1984).

$$FGT = 1/n * \sum_{i=1}^{q} \left[\frac{z - c_i}{z} \right]^{\alpha} \tag{1}$$

where n is the total number of households, q is the number of poor, z is the poverty line and c_i is the welfare indicator y of an individual household (i). If $\alpha = 0$ equation 1 represents the headcount index which simply displays the percentage of households living below the poverty line. Taking $\alpha = 1$ results in the poverty gap; this index measures the mean proportionate expenditure shortfall over the total population. The poverty severity index is calculated squaring the expenditure shortfalls before aggregation (setting $\alpha = 2$), thus putting a higher weight on larger shortfalls. Table 2 reports the development of the aggregate poverty indices; all indices show an increase from 1994 to a peak

[4] The RLMS project can be divided in sampling phases one and two. After the first 4 rounds the sampling design was changed resulting in a smaller RLMS sample but a doubling of the number of primary sampling units.

[5] Note that in 1997 and 1999 no survey round took place.

[6] A detailed description of the construction of these variables can be obtained from the author on request. A somewhat less detailed description is also available on the RLMS website.

[7] I have also performed the same poverty analyses using total income as a welfare indicator. The poverty indices and poverty profile decompositions show similar trends and poverty prone groups. However, the estimated poverty levels and poverty gaps are higher when using income as a welfare indicator, a result well known in poverty research. Main reason for this discrepancy is that households have a tendency to underreport income earnings because they are part of black market activities and/or for fear of tax authorities (see for instance Ravallion, 1994).

Table 2: Aggregate poverty indices

	1994	1995	1996	1998	2000	2001
Headcount (%)*	11.5	17.8	20.6	32.4	20.9	15.0
Poverty gap	4.0	6.1	7.6	12.4	7.2	5.1
Poverty severity	2.1	3.1	4.1	6.7	3.5	2.6
* Foster-Greer-Thorbecke class of poverty indicators (1984).						
Source data: constructed variables RLMS						
** Not available (n.a.)						

in 1998, followed by a sustained fall.[8] The headcount index shows that the percentage of poor households nearly triples from 11.5 in 1994 to 32.4 in 1998. The average expenditure shortfall rose to a peak of 12.4% in 1998, decreasing until 5.1% in 2001. The poverty severity index reveals that, in addition to an increase in the number of poor households and the average poverty shortfall, poverty also became more severe in the sense that households were experiencing larger shortfalls during the crisis.

The poverty profile reported in table 3 shows the headcount indices for subgroups of Russian households[9]. The trends observed in the aggregate poverty indices are also reflected for these subgroups. The first is a decomposition according to the type of dwelling space. Rural households are disproportionately more often poor than urban households while at the same time it becomes clear that especially the urban and semi-urban households suffered from the crisis. The urban headcount index tripled from 1994 to 1998 while the rural headcount doubled. However, urban households seem to recover faster from the crisis. In absolute terms there are more poor urban households, as rural households comprise only 25% of the Russian population.

Households with children show higher poverty rates than households with no children, and the higher the number of children, the higher the poverty headcount. Households including elderly household members (age $\geq$ 60 for women and age $\geq$ 65 for men) fall less often into poverty than households without elderly. Decompositions of households according to household size show that single person households and large household typically have higher poverty rates than medium sized households. These characteristics are also reflected if I calculate the poverty headcount index for specific household types. Elderly couples indeed have lower poverty rates than the other household types, but elderly people living alone have higher poverty rates. Single mothers are also particularly vulnerable to poverty.

3 Consumption insurance

The transition phase in Russia is characterized by a multitude of shocks resulting from the restructuring of the economy thereby shaping a highly uncertain environment for Russian house-

[8] In order be representative for the Russian population, these poverty indices are calculated using the yearly adjusted household post-stratification weights that have been calculated by the RLMS.

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

Table 3: Poverty profile based on headcount index

	1994	1995	1996	1998	2000	2001
Settlement type						
Urban	10.7	16.4	16.9	31.9	18.6	12.6
Semi-urban	10.0	12.8	21.5	34.4	19.8	10.5
Rural	14.2	22.5	29.7	33.3	26.6	22.0
Number of children						
0	12.0	15.5	18.0	30.2	18.0	14.2
1	9.2	19.1	20.7	31.5	21.5	14.4
2	11.1	20.8	26.1	40.7	28.6	18.4
>2	20.9	28.0	35.5	39.8	32.6	20.3
Number of pensioners						
0	11.1	18.9	22.5	35.7	22.6	16.4
1	13.8	19.6	20.4	33.5	21.6	14.2
>1	9.0	10.4	14.6	20.2	13.8	11.7
Household size						
1	15.5	18.4	18.2	29.9	15.8	12.3
2	9.8	13.6	18.4	28.3	19.3	14.7
3	10.7	20.1	20.5	35.4	21.2	15.5
4	10.3	17.8	23.3	36.6	25.0	15.2
5	12.6	24.0	24.0	35.6	25.2	17.9
≥6	16.9	19.9	30.0	32.1	28.8	23.8
Household type						
Elderly couple	8.6	8.6	12.1	17.1	12.4	7.9
Elderly single	14.5	18.3	17.0	28.4	13.8	10.0
Parents & 2 kids	11.2	18.5	26.5	38.8	26.0	15.9
Parent & 1 kid	8.4	18.7	19.2	32.7	16.8	12.9
Couple (no kids)	8.4	13.4	20.4	35.4	16.6	15.5
Single mother	12.8	21.4	28.1	40.7	35.8	26.6
Source data: constructed variables RLMS						

holds. In addition, households are also facing a wide range of idiosyncratic risks and shocks such as illness, job loss, payment arrears, unpaid leave but also crop failure. Participatory poverty studies in transition economies reveal that households experienced and disliked the surge in uncertainty that accompanied the transition phase (among others World Bank, 1999). Microeconomic theory states that uncertainties about future income or consumption reduce the expected utility that risk averse households can derive from it. It therefore makes the exercise to evaluate households' ability to deal with such shocks an interesting and a relevant one. As in many cases shocks impact households through their income generating activities one approach is to analyze to what extent households are able to protect their consumption against income shocks (Townsend, 1994; Skoufias, 2003). In this way one can shed some light on another dimension of welfare; being able to maintain stable consumption patterns over time.

The previous section has shown that the distribution of poverty varies with demographic and regional characteristics. In this respect it is very likely that households are also not equally able to smooth their consumption[10]; households can safeguard (part of) their consumption from income shocks through saving, borrowing, adjusting labor supply, cultivating land and selling assets. Such strategies can be classified as self-insurance (Skoufias, 2003). However, households can also rely on other people through informal, private, government risk sharing or private market insurance schemes offered by financial institutions (Deaton, 1997; Fafchamps and Lund, 2003). The possibilities for coping with shocks are partly determined by households' assets. 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, credit might be obtained through a family member, neighbor or acquaintance.

Consumption insurance can be analyzed using a microeconomics framework. When income is volatile and consumers are risk averse, consumers are willing to trade some of their average income to ensure greater income stability and hence stability in consumption. Households' insurance decisions can be approximated using an Arrow-Debreu economy (Gravelle and Rees, 1992). In this economy uncertainty exists because there are different states of the world that can prevail in the future while in the end only one state will prevail. 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 averse consumers arise. Risk sharing can 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 is possible; for every state of the world consumers can buy a different security. Albeit very abstract, this market for state contingent claims can 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 and 1997).

Following the approach outlined in Deaton (1992, p. 35-36), the intertempotal utility function

[10] I use the terms consumption smoothing and consumption insurance interchangeably.

can be represented with

$$u_i = \sum_{s=1}^{S} \sum_{\tau=t}^{T} \pi_s \upsilon_\tau \left(c_{i\tau s} \right) \tag{2}$$

where the utility, u, enjoyed by household i is a function of $\upsilon_\tau \left(c_{i\tau s} \right)$, the utility value of consumption enjoyed in state of the world s, in period t, multiplied by all possible states of the world ($\sum_{s=1}^{S}$), in all time periods ($\sum_{\tau=t}^{T}$t), and the probability of occurrence π_s. On the Arrow securities market households can buy a unit of (future) consumption in state s at time t for a price $p_{st} \left(1+r \right)^{-t}$. The life-time budget constraint is

$$\sum_{s=1}^{S} \sum_{\tau=t}^{T} p_{st} c_{ist} \left(1+r \right)^{-t} = A_i^0 + \sum_{s=1}^{S} \sum_{\tau=t}^{T} p_{st} y_{ist} \left(1+r \right)^{-t} \tag{3}$$

where y_{ist} is household income in state s at period t, A_i^0 are households initial assets and $\sum_{s=1}^{S} \sum_{\tau=t}^{T} p_{st} y_{ist} \left(1+r \right)^{-t}$ represents the state contingent claims. The first order condition for 2 subject to 3 is

$$\lambda_t \left(c_{ist} \right) = \theta_i \left(\frac{1+\delta}{1+r} \right)^t \frac{p_{st}}{\pi_s} \tag{4}$$

where θ_i is the Lagrange multiplier for household i and δ the depreciation rate relfecting time preferences. Then replace state contingent consumption (c_{ist}) by actual consumption (c_{it}) that arises when state s prevails at time t. Deaton discusses that an important result arises when all risks are pooled; even though marginal utilities vary between households and over time, the ratio of marginal utilities for any two households does not change because households have used the ex ante opportunity to pool risks.

Now, if the utility function is assumed to be of the iso-elastic form $v \left(c_t \right) = \frac{1}{1-\rho} c_t^{1-\rho} f \left(z_t \right)$ and allowance is made for time-vaying taste factors $f \left(z_t \right)$, the marginal utility is given by $\lambda \left(c_t \right) = f \left(z_t \right) c_t^{-\rho}$ for some function $f \left(z_t \right)$. After substituting the marginal utility in equation 4, taking logarithms and first time differences equation 4 can be expressed as

$$\Delta \ln c_{i,t} = -\rho^{-1} \left(-\Delta f \left(z_t \right) + \Delta \ln \mu_t \right) \tag{5}$$

where u is independent of the household i. The interpretation of this equation is that, as a result of risk sharing, changes in household consumption over time are only a function of changes in aggregate shocks $-\rho^{-1} \left(\Delta \ln \mu_t \right)$. Time-varying taste factors operate as control variables. An empirical version of equation 5 is (among others Skoufias, 2003)[11]:

[11] Townsend (1994) is one of the first to test a full-insurance model in a number of high risk villages in India and to examine degrees of insurance among different types of households.

$$\Delta c_{i,t} = \alpha_0 + \beta_1 \Delta y_{i,t} + \sum_{j=1}^{k} \gamma_j x_{j,i,t} + \sum_{j=1}^{w} \delta_j D_{j,t} + \epsilon_{i,t} \tag{6}$$

where $\Delta c_{i,t}$ represents the natural logarithm of total consumption change for household i, in period t, $\Delta y_{i,t}$ represents the natural logarithm of total household income change, $x_{j,i,t}$ is a particular household characteristic, such as family size and demographic composition, $D_{j,t}$ is a binary variable specifying in which community a particular household lives, and $\epsilon_{i,t}$ is a random error term. This equation enables a test of the full insurance hypothesis; irrespective of the insurance strategies used, if $\beta_1 = 0$, households are able to fully insure themselves against any income shocks risk sharing hypothesis. When this hypothesis is rejected households can only partially insure their consumption against income shocks.

4 Model specification

The economic, social and geographic diversity encountered in the Russian Federation makes it is relevant to take (un)observed heterogeneity between households into account. Additionally, differences in the pre-shock level of household resources also influence the ability of households to insure themselves against income risks. I therefore rewrite equation 6 as a random effects panel model and allow for dynamics in the estimation[12]. Because I excluded the households that moved from the sampled dwelling over time, the area dummy variables $D_{j,t}$ become time-invariant. That is, for each household, these variables stay constant over time and thus disappear from the model after taking first differences. This results in the following dynamic random effects panel model:

$$\Delta c_{i,t} = \alpha_0 + \alpha_1 c_{i,t-1} + \beta_1 \Delta y_{i,t} + \beta_2 y_{i,t-1} + \sum_{j=1}^{6} \gamma_j x_{j,i,t} + \delta_1 DURB_i + \delta_2 DRUR_i + v_i + \epsilon_{i,t}, \tag{7}$$

where, in addition to the change in expenditures and income, the lag of income $y_{i,t-1}$ and expenditures $c_{i,t-1}$ for household i are included. Further, $x_{j,i,t}$ denotes the number of household members in the j^{th} age category, $DURB_i$ a dummy indicating whether household i lives in an urban area, $DRUR_i$ a dummy whether household i lives in a rural area[13], v_i is an independent and indentically distributed (i.i.d.) $\left(0, \sigma_v^2\right)$ random individual effect, and $\epsilon_{i,t}$ is an i.i.d.$\left(0, \sigma_\epsilon^2\right)$ error term. This equation can be rewritten in levels as[14]:

$$c_{i,t} = \alpha_0 + (1+\alpha_1) c_{i,t-1} + \beta_1 y_{i,t} + (\beta_2 - \beta_1) y_{i,t-1} + \sum_{j=1}^{6} \gamma_j x_{j,i,t} + \delta_1 DURB_i + \delta_2 DRUR_i + v_i + \epsilon_{i,t}. \tag{8}$$

β_1 is the insurance parameter and provides information about the question whether households are able to protect their income from short-run fluctuations in their income.

[12] Skoufias (2003) used this approach to measure the extent to which Russian households are able to protect (or insure) their consumption against income shocks. He estimates equation 5 by means of a pooled ordinary least squares (OLS) estimation.

[13] A third category is semi-urban, but this has been left out to avoid multicollinearity. The inclusion of a constant, α_0 accounts for the effect of this category.

[14] A levels-based equation facilitates an estimation in many software packages. One caveat applies however; any estimate for the coefficient $(\beta_2 - \beta_1)$ yields standard errors that cannot be used for inference on β_2.

The model specified in equation 7 above can be rewritten alternatively as an error correction model (ECM) thereby distinguishing between short and long run dynamics in the relationship between household expenditures and income. Rewrite β_2 as $\frac{\alpha_1}{\alpha_1}\beta_2$ for $\alpha_1 \neq 0$. Then, the standard model can be rewritten as

$$\Delta c_{i,t} = \alpha_0 + \beta_1 \Delta y_{i,t} + \alpha_1 (c_{i,t-1} - (\frac{-\beta_2}{\alpha_1}) y_{i,t-1}) + \sum_{j=1}^{6} \gamma_j x_{j,i,t} + \delta_1 DURB_i + \delta_2 DRUR_i + v_i + \epsilon_{i,t.} \quad (9)$$

Note that the rural/urban effects can be included in the v_i's because they are time invariant. The ECM reflects the idea of an intertemporal budget constraint; as the stock of wealth is limited, consumption can exceed 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. In equation 9, β_1 is the short run income elasticity of consumption and the insurance ability parameter. α_1 is the so-called error correction coefficient, which compensates for the short run overshooting or undershooting of consumption; in case of a complete correction this parameter will have a value of -1. $(\frac{-\beta_2}{\alpha_1})$ is the long run income elasticity of consumption; it is likely that the value of this parameter is higher than that of its short run counterpart because it is more difficult to insure consumption over a longer period (assets or savings can be depleted, friends and family will stop assisting at some time).

5 Data description

This study uses data from the Russian Longitudinal Monitoring Survey (RLMS). The RLMS is a household-based survey that is designed by an interdisciplinary group of Russian and American social scientists with the objective to measure the economic well-being of households and individuals in Russia. The survey has been designed as a repeated sample of each household dwelling, meaning that the sampled dwelling place is revisited every survey round. Households that moved are lost. Only from rounds 8 on, attempts were made to follow moved households. The data have been collected over 10 rounds since 1992[15]. For each round, information is collected on individual, household and community levels on a wide range of variables such as expenditures, income, assets, land use, employment, education and health. The RLMS can be used for (repeated) cross-section as well as panel analyses.

I use data from the second phase of the RLMS project for the years 1994, 1995, 1996, 1998, 2000 and 2001 (rounds 5 to 10). Note that in 1997 and 1999 no survey round took place. For my analysis I have selected the households that a) were observed in all rounds and b) had no missing observations on any of the variables that I use in the analysis.[16] In the course of the sample selection process I also decided to delete so-called offspring households. Offspring households are created when a household splits up in 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. However, for the previous rounds both households shared an identical past. I decided to delete the offspring households. Starting the sample selection 2,370 households were observed in all rounds, 2,130 households remained after

[15] The data are publicly available and can be obtained through anonymous FTP server from the RLMS website.
[16] This way the panel dataset is balanced.

deleting the offspring households. The sample was further reduced to 1,762 households due to missing observations for the relevant variables.

I 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 19-64, female aged 19-59, male aged over 64 and female aged over 59) and categorical variables providing information on the household's location such as rural, urban, semi-urban, region and community (by means of dummy variables).

I have composed the expenditures and income variables in the following way[17]: 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 out 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, recreation, rent, utilities, and other payments such as tuition and insurance (excluding loans). I excluded expenditures on durables and other luxury items because their consumption value extends over multiple periods. The value of total consumption is expressed in June 1992 prices by dividing by the regional consumer price index constructed and used by the RLMS. Household gross income consists of cash income as well as the monetary value of in-kind income. The income variable is constructed by summing income from salary, rent, interest receipts, pension benefits, child allowances, maternity benefits, family and other benefits, net income from sales of farm products (i.e., subtracting farm related expenses) and other income. I excluded the income from unemployment insurance or transfers received from friends and relatives and money borrowed because these sources of income are likely to reflect ex post adjustments to shocks.

Data inspection revealed that some households had non-positive values for the expenditure and income variables. I have excluded the small number of households for which expenditures were non-positive. In contrast, it is possible that negative values for income can arise because of the component 'net income from sales of farm products'. This can be negative when investments (i.e., buying seeds or equipment) are larger than revenues from farm product sales. Summed over all rounds, 215 households experienced negative total income. For these households I have replaced the missing values that were generated after taking the natural logarithm by the value of 0. Table 4 provides the mean values of the key variables in each round. It can be noticed that total expenditures are systematically above income, which is a common feature of these data. An important reason for this is that households have a tendency to underreport income because they fear that this information is passed on to tax authorities.

6 Model estimation and specification

To estimate the dynamic panel model outlined in section 4, I use an estimator based on the Generalized method of moments(GMM). This GMM estimator yields consistent and more efficient than other method of moments estimators (Arellano and Bond, 1991; Wooldridge, 2001; Greene, 2003).[18] In addition, Arellano and Bond (1991) argue that additional instruments can be used in

[17] To facilitate comparison, I have composed the income and expenditure variables in the same way as Skoufias did (2003, p70-71).

[18] Using an instrument variable estimator would be a consistent, albeit less efficient method.

Table 4: Mean of key variables in every round (monthly, in real 1992 Rubles)

Round	**Year**	**Expenditures**			**Total income**
		Food	Nonfood	Total	
5	1994	6,538	3,059	9,598	6,699
6	1995	5,242	2,695	7,938	5,177
7	1996	4,183	2,746	6,930	4,694
8	1998	3,190	2,109	5,300	3,751
9	2000	3,359	2,751	6,110	4,631
10	2001	3,604	3,070	6,675	5,381
Total		4,353	2,739	7,092	5,055

a dynamic panel data model when using the orthogonality conditions that exist between lagged values of the dependent variable, consumption, and the disturbances $\epsilon_{i,t.}$.[19] Note that in equation 8, $c_{i,t-k}$ for any k is correlated with v_i. This is problematic because the lags of consumption will not be a valid instrument. I therefore take differences of equation 8:

$$\Delta c_{i,t} = (1+\alpha_1)\Delta c_{i,t-1} + \beta_1 \Delta y_{i,t} + (\beta_2 - \beta_1)\Delta y_{i,t} + \sum_{j=1}^{6} \gamma_j \Delta x_{j,i,t} + \Delta \epsilon_{i,t}. \tag{10}$$

As the rural/urban dummy variables are time-invariant (the households in the sample did not move from their dwelling place), they are removed as well as the constant and the individual effects by first-differencing. In this way, the correlation between lagged consumption and the individual effects is removed. Note that by differencing an MA(1) with unit root term $\Delta\epsilon_{i,t}$ is created. Because of this MA(1) term the model is subject to first-order autocorrelation, though not subject to any higher degrees of autocorrelation. For period t, $c_{i,t-2}$ is a valid instrument for $\Delta c_{i,t-1}$, for it is not correlated with $\Delta\epsilon_{i,t}$,but is highly correlated with $\Delta c_{i,t-1}$. As t increases, more lags can be added as instruments. Furthermore, if the other regressors are assumed to be exogenous, they can be used as their own instruments. This gives a set of valid instruments to impose the moment equations in the GMM.

The Arellano-Bond dynamic panel data estimator is derived using lagged levels of consumption and the differences of the explanatory variables; this methodology assumes that there is only first-order autocorrelation in the differenced idiosyncratic errors but no second order correlation.[20] A consistent GMM estimator requires that there is no second-order autocorrelation, thus that $E(\Delta\epsilon_{i,t}, \Delta\epsilon_{i,t-2}) = 0$.[21] It is also important to check for first-order autocorrelation to exclude the possibility of not rejecting the null hypothesis in case that the residuals in levels follow a random walk. The test statistics for all the estimated subsamples confirm that assumptions on the model are correct.

Another important model specification test is the Sargan test, which tests the validity of the instruments.[22] For the overall panel, I find a strong rejection of the null hypothesis implying that

[19] Baltagi (2001) provides a good overview of the Arrellano and Bond procedure.

[20] The empirical model is estimated for the complete panel as well as for a number of subsamples using the Stata 8.0 software package.

[21] This test can only be used for $T \geq 5$ (see for instance Baltagi, 2001).

[22] The Sargan test is the most common test of the instruments. Arellano and Bond (1991) find that the Sargan

the over-identifying restrictions are not valid ($\chi^2_9 = 329.64$, Pr $> \chi^2_9 = 0.0000$). This suggests that not all the explanatory variables can be treated as strictly exogenous[23]. I therefore examined the effects of treating some up to all of the explanatory variables as predetermined or even endogenous (these results are not reported here). The analysis points out that the demographic age categories are correctly defined as exogenous, meaning that their values are determined outside the system, independent of consumption. Income on the other hand, is found to be predetermined meaning that future values of this regressors are correlated with the current error, so that $E(y_{i,s}\epsilon_{i,t}) \neq 0, \forall t \leq s$ and also $E(y_{i,s-1}\epsilon_{i,t}) \neq 0, \forall t \leq s$. This means that I can only use these explanatory variables as valid instruments up to the same date as the error term. By specifying the model in this way, the Sargan-test statistic is reduced by approximately half in magnitude, but still with a strong rejection of the null hypothesis. It is possible that the overall panel model does not sufficiently capture the heterogeneity of the data. Alternatively, the large size of the panel might influence the outcome of Sargan's test through the critical value in such a way that it facilitates the rejection. A confirmation for these suspicions is found when the model is estimated for subsamples in the panel data. Table 5 reports the p-values of the Sargan test; in a number of cases the null cannot be rejected and in the other cases the rejections are less strong. Thus, to some extent analyzing subsamples allows to control for unobserved heterogeneity in the data.

Before deciding on the final model-specification of the subsamples, I used another test to check how the income variables should be treated, i.e., as predetermined or endogenous. Hausman (1978) originally proposed a test statistic for endogeneity based upon a direct comparison of coefficient values. This specification test compares two estimators: one that is (or one believes to be) consistent whether or not the hypothesis is valid and a second one that is efficient (and consistent) under the null hypothesis to be tested.[24] The conclusions of this test are reported in table 5.

Table 5 further reports the estimation results of the main parameters as well as the size of the sample in terms of number of households and observations. The coefficients for lagged consumption $(1 + \alpha_1)$ and current income (β_1) are significant for most of the subsamples. Lagged consumption is insignificant for households with more than 2 children, childless couples and single mothers. The small sample size and limited number of observations of these subgroups is a possible explanation for this result. The estimated parameters for lagged income $(\beta_2 - \beta_1)$ are only significant for some subsamples. This means that past income has only limited explanatory power for current consumption. The coefficients can be interpreted as elasticities which implies, in the case of the overall panel, that a 10% decrease in income will only result in a 1.1% decrease in consumption. It is important to realize that the size of the elasticity's in the estimates is sensitive to the choice of time period; including more or fewer survey rounds will change the estimates.

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test of the one-step estimation over-rejects in the presence of heteroskedasticity and therefore recommend to use the two-step Sargan test given by

$$m = \Delta\widehat{\epsilon}' W [\textstyle\sum_{i=1}^{N} W_i'(\Delta\widehat{\epsilon}_i)(\Delta\widehat{\epsilon}_i)' W]^{-1} W' \Delta\widehat{\epsilon} \sim \chi^2_{p-K-1}, \tag{11}$$

where p refers to the number of columns of W (the matrix of instruments) and $\Delta\widehat{\epsilon}$ denotes the residuals from the two-step estimation.

[23] Thus, not all orthogonality conditions implied by strict exogeneity $(E(x_{i,s}\epsilon_{i,t}) = 0, \forall s, t)$ hold for the model.

[24] The test statistic looks as follows:

$$h = (\widehat{\delta}_1 - \widehat{\delta})' [\widehat{avar}(\widehat{\delta}_1) - \widehat{avar}(\widehat{\delta})]^{-1} (\widehat{\delta}_1 - \widehat{\delta}) \sim \chi^2_r, \tag{12}$$

where $r = \text{rank}(\widehat{avar}(\widehat{\delta}_1 - \widehat{\delta})$ and $\widehat{avar}$ is asymptotic variance (Greene, 2003).

Table 5: Summary estimation results

	$1+\alpha_1$	β_1	$\beta_2-\beta_1$	Sargan	Hausman	# of HH	Obs.
				(P-value)	(Income)		
Overall panel	0.123***	0.112***	0.042***	0.000	Pred.	1,762	7,048
Settlement type							
Urban/Semi-urban	0.124***	0.569***	-0.029	0.000	End.	1,181	4,724
Rural	0.122***	0.262***	0.027*	0.000	End.	581	2,324
No. of children							
0	0.166***	0.368***	0.004	0.000	End.	1,159	3,887
1	0.117**	0.487***	0.016	0.034	End.	882	2,194
2	0.187***	0.555***	0.0	0.072	End.	451	1,115
>2	-.044	0.205***	0.022	0.137	Pred.	110	258
No. of pensioners							
0	0.149***	0.435***	-0.005	0.000	End.	953	3,380
1	0.097***	0.320***	0.024*	0.000	End.	1,014	3,605
>1	0.165***	0.289***	0.013	0.000	End.	457	1,353
Household type							
Elderly couple	0.137***	0.156**	0.072***	0.000	End.	326	911
Elderly single	0.072*	0.131***	0.067***	0.000	Pred.	324	1,014
Parents & 2 kids	0.207***	0.375***	0.015	0.130	End.	274	666
Parent & 1 kid	0.124**	0.171***	0.076***	0.033	Pred.	313	719
Couple (no kids)	0.1	0.156***	0.039	0.074	Pred.	218	450
Single mother	0.043	0.120**	0.052	0.034	Pred.	120	245
* 10%, ** 5% and *** 1% significance level, using robust standard errors (White, 1980)							
Included in estimation of overall panel (not reported): changes in variables controlling for demographic composition.							
Results Hausman test: income is predetermined (Pred.) or income is Endogenous (End.)							

7 Interpretation and discussion

In section 4 the consumtpion insurance indicator was derived through the error-correction model (equation 9). The value of α_1 is expected to be negative and close to unity because households want to compensate for under- and over-consumption in previous periods. Thus a value of $\alpha_1 = -1$ indicates a full compensation in terms of consumption to a change in income in the long run. $-\beta_2/\alpha_1$ represents the long-run income elasticity of consumption and β_1 is the analogue for the short-run. β_1 can be interpreted as an insurance indicator: when it is close to zero, households insure themselves against income shocks, when it is close to one, households do not (or are not capable) of insuring themselves. As discussed in section 3, β_1 represents the outcome of a mix of insurance strategies; it does not only comprise of self-insurance strategies such as borrowing, adjusting labor supply, 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.

At this point it is important to elaborate somewhat on these insurance strategies, the costs of different insurance strategies and their welfare impact. In this paper, the degree of insurance reflects the ability of households to cope with income shocks. From one point of view, this is an important evaluation criterion in terms of welfare as it shows whether households are capable of consumption smoothing in a highly uncertain environment. However, the model presented in this paper does not indicate at which cost this insurance is achieved. For example, households may accumulate non-productive assets that they can sell in times of trouble but this capital could have been used for other investments (for example education) with a higher expected return. In this respect, Skoufias (2003) distinguishes between costly self-insurance and more efficient risk-sharing within a community. There is, however, also a role for financial markets and the government in the provision of efficient formal private financial services and social insurance. Another point, albeit beyond the scope of households' insurance arrangements, is that public authorities can achieve reduction of income risks by means of a stable macroeconomic environment as well as through the enforcement of property and civil rights.

In this paper I compare the abilities of consumption insurance with a welfare outcome in terms of poverty for a number of regional and demographic groups. Table 6 reports the coefficients of the error correction model (equation 9) which are retrieved from the estimated model of equation 10. As expected, the error correction coefficients are all negative and approach values that are close to unity meaning that, in the long run, households completely adjust their consumption to the changed income. The degree of insurance varies considerably among the sub-samples. The decomposition into rural and (semi-)urban regions suggests that rural households are more capable of insuring their consumption from income shocks than urban households; where urban households fail to insure 57% of the size of the income shocks in the short run, only 26% of the changes in consumption of rural households can be explained by changes in income. However, the poverty profile displayed in table 3 has shown that households in rural areas find themselves disproportionately more in poverty. A possible explanation for this interesting result is that households in urban areas are more dependent on the proceeds from income generating activities than rural households, which renders them more vulnerable to income shocks. In addition, rural households might have more opportunities for own food production (and make use of these opportunities). As was seen in table 1, the period of transition is characterized by large increases in the Consumer Price Index and GDP deflator. In such times, the production of foodstuffs (also counted as income in the RLMS) can be a hedge

Table 6: Error correction model coefficients

	Error correction coefficient	Short run elasticity	Long run elasticity
	(α_1)	(β_1)	$(-\beta_2/\alpha_1)$
Overall panel	-0.877	0.112	0.176
Settlement type			
Urban/Semi-urban	-0.876	0.569	0.617
Rural	-0.878	0.262	0.329
# of children			
0	-0.884	0.368	0.421
1	-0.883	0.487	0.570
2	-0.813	0.555	0.682
>2	-1.044	0.205	0.217
# of pensioners			
0	-0.851	0.435	0.505
1	-0.903	0.320	0.381
>1	-0.835	0.289	0.361
Household type			
Elderly couple	-0.863	0.156	0.264
Elderly single	-0.928	0.131	0.214
Parents & 2 kids	-0.793	0.375	0.492
Parent & 1 kid	-0.876	0.171	0.282
Couple (no kids)	-0.900	0.156	0.217
Single mother	-0.957	0.120	0.179

against inflationary shocks. On the other hand, the urban environment provides more opportunities in terms of employment and entrepreneurship for making a decent living (above the poverty line)[25].

When looking at demographic sub-samples it can be seen that as the number of children increases, the short run elasticity of income on consumption also increases, thus reducing the ability of consumption smoothing. Section 2 has shown that households with more children are more likely to be found poor. This result intuitively makes sense as such households have higher dependency ratios; there are less economic active adult(s) that have to make a living for themselves and their dependent children making the household as a whole more vulnerable to income shocks (such as job loss) but also to poverty. The relationship does not hold for households with more than two children, which have the highest degree of consumption insurance. A possible explanation is that the results are imprecise due to the small sample size of this particular group (only 120 households and 258 observations). In addition, this category of households is typically found in rural areas where, as I have hypothesized before, the possibilities for consumption smoothing are higher.

The results also show that having one or more elderly as household member increases the ability of consumption smoothing, and reduces the poverty rates of this category. Every elderly citizen in the Russian Federation is entitled to a pension (eligible age is 60 for women and 65 for men). This pension consists of a basic amount plus increments that depend on the employment record but in reality these amounts of pension received did not differ widely during the transition period (Social Security Association, 2002; Zurabov, 2002)[26]. In this respect, one hypothesis is that elderly household members facilitate consumption smoothing as these pensions provide a stable income source. However, this is only partially true as the high inflation during the economic crisis of 1998 eroded the real value of pensions (Zurabov, 2002). However, elderly household members may support the household by other income generating activities or a care-takers thus enabling labor force participation of other adults in the household.

When looking at specific household types, the results are more mixed. Firstly, the estimated short run income elasticity's are considerably lower than those in the other sub-samples (but closer to the estimate of short run income elasticity for the overall sample). Secondly, the estimated insurance indicators do not differ widely in size (except that for the parents with two kids). Some of the results still hold; households with children have higher income elasticity's while elderly couples and childless couples have lower elasticity's. A counter-intuitive result however is, that single elderly and single mothers seem to be better insured than larger households. At the same time the poverty profile shows that these two groups find themselves disproportionately more often in poverty. One reason might be that single mothers and single elderly have better access to and receive more in-kind support from informal social networks (through family and friends) than other households. In addition, the precision of the estimates might be reduced by a lower spread in the observed income levels of these groups as well as by the smaller sample size of these specific household types.

It cannot be excluded that these results may, to some degree, suffer from attenuation bias caused by uncontrolled heterogeneity as well as measurement and imputation errors in the income and consumption variables. Attenuation bias results in a downward bias in the estimated coefficients

[25] The results from the OLS estimates from Skoufias (2003) give opposite results for the urban/rural sub-samples. Suspecting attenuation bias, Skoufias also applies an instrumental variable approach using instruments of income which renders estimates that are more in line with the results presented here (although his estimates for the rural sample are insignificant).

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

(Greene, 2003). However, given the high significance of the insurance indicator in all sub-samples I can reject the null-hypothesis of complete insurance. In addition, in the larger sized sub-samples the differences between the estimated short run elasticity's are substantial and can be reasonably explained.

8 Conclusion

This paper examined to what extent Russian households are able to insure their consumption against income shocks and related these results to poverty. Extending the empirical model of Skoufias (2003), the use of the panel element in the Russian Longitudinal Monitoring Survey (RLMS) was improved by the dynamic random effects model specification. This enabled to control for unobserved random effects. In addition, rewriting this model as an error correction model allowed for the distinction between long and short run income elasticity's of consumption. The application of a GMM estimation procedure solved the endogeneity problem caused by the inclusion of a lagged dependent variable thus giving consistent estimates. Additionally, GMM provides more efficient results than generalized least squares (GLS).

The analyses show that households only partially insure themselves to income shocks; therefore allowing for a rejection of the null-hypothesis of perfect insurance. The degree of insurance also varies according to household characteristics; households living in an urban environment as well as households with children have higher income elasticity's of consumption. In contrast, rural households and households with elderly member seem to be better able to achieve consumption smoothing. Comparison of poverty statistics with the insurance indicator show that higher degrees of consumption insurance are not always accompanied by lower poverty rates and vice versa. Households in urban areas are more vulnerable to income shocks but have disproportionately lower poverty rates. A similar relationship holds for single mothers and single elderly. On the other hand, households with more children have higher income elasticity's as well as poverty rates. These results are informative for policymakers. Scholars such as De Neubourg and Holtzman propose a new orientation of social protection policy; these policies should not only be concerned with basic poverty relief but there is also an important role for the government in terms of assisting households with risk management (de Neubourg and Weigand, 2000; Holtzman et al, 2000). Beyond the scope of social policy (but within the scope of government policy), lies the fact that public authorities play an important role in capitalist economies and can exercise a positive or negative influence on macroeconomic stability (thus reducing sources of uncertainty in the household environment).

I have provided a number of intuitively appealing reasons for these results. Testing these hypotheses requires further research into the specific insurance strategies followed by households, as well as the composition of income and expenditures and the role of household (food) production. Furthermore, this paper only discusses consumption insurance with respect to a limited number of household characteristics and obviously much more interesting decompositions can be made. Another point is that I have thus far analyzed the impact of income shocks on consumption, which is only one component of uncertainty. Households may also pursue income smoothing strategies instead of consumption smoothing (Morduch 1994 and 1995). In this way they prevent income shocks from occurring in the first place.

Another issue that requires further research is that I might not have fully controlled for the

heterogeneity in my sample. By only controlling for the demographic composition of the household, I used the bare minimum of household characteristics. Additionally, an obvious concern for this type of data is measurement error, particularly in the income and consumption variables. Measurement error causes so-called attenuation bias in the estimated coefficients but it also implies for the analysis that it cannot be known whether an income shock is really an income shock or caused by measurement error.

9 References

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