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by

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ABSTRACT

This study provides a unique view of the demand for carbohydrate sources in Russia at the household level. The data used in this analysis was obtained from a 1996 survey in eight Russian metropolitan areas. An AIDS model is used to examine the expenditures for potatoes, bread, flour, rice, and pasta. The impacts of household demographic factors on the consumption of carbohydrates are also discussed.

Key words: carbohydrate sources, consumer demand, demographic variables, household survey, Russia, Shonkwiler and Yen consistent two-step estimation procedure

HOUSEHOLD EXPENDITURE PATTERNS FOR CARBOHYDRATE SOURCES IN RUSSIA

The volatile nature of the Russian political and economic system in recent years has brought about severe changes in the availability of food for consumers. Russia has experienced a staggering 35% year-to-year drop in forecast grain (primarily wheat) availability during the past 5 years, partially due to adverse weather conditions and in part due to the virtual elimination of grain exports. Imports of processed food have likewise been decimated since the devaluation of the ruble in August 1995. Reduced purchasing power has forced Russian consumers to rely more on basic food items such as bread, but the declining availability of grain has made even these "cheap" energy sources more expensive (USDA-FAS, 1998).

The economic crisis of 1998 triggered hyperinflation in Russia. From September 1998 to August 1999, the nominal price of wheat (in rubles) in Russia nearly tripled, going from 1,020 R to 3,010 R ($80 to $124) for metric ton. Similarly, the nominal price of top-grade flour more than doubled during this time period, from 3,380 R to 7,005 R. These prices continued to rise even though the production and import projections for 1999 were higher than in previous years (USDA-FAS, 1999a). The consumer price index (CPI) increased by 120% during the period of September 1998 through August 1999, where as food and beverages price index by 140% during the same time period.[1] That was a big increase in the rate of inflation compared to 1996 and 1997 when CPI rose only 20% and 10% respectively.[2] Inflation slowed down again in 1999. The CPI rose 40% and 20% in the years of 1999 and 2000 respectively (RECEP). The similar change (1.35 and 1.17) was observed in the food and beverage index for 1999 and 2000 (RECEP). A similar change was observed in the food and beverage index for 1999 and 2000.

Lower than average potato harvests in recent years have also spurred Russian imports of potatoes. Prior to 1997-98, annual potato imports had dropped to roughly 70,000 tons due to above-average production. Low production in 1997-98 resulted in imports swelling to 180,000 tons. However, 1998-99 imports were forecasted to be only 130,000 tons because of the 1998 ruble devaluation (USDA-FAS, 1999b). As with grains, potatoes represent a primary energy source for Russian households that has become more expensive due to reduced purchasing power.

In the last few years, Russia experienced economic turnaround. New economic reforms, including the law of land ownership, have promoted further growth of the Russian economy and political and economic integration of Russia with western economies such as EU and the U.S. Although harvest volume was good in 2001, the availability of quality wheat is a concern. Current low grain prices may negatively affect next year's output by reducing incentives for farmers to plant spring crops (USDA-FAS, 2001) . Grain imports are expected to increase in 2002. However, Russia will still have a positive grain trade balance as export shipments should still be greater than imports. Nevertheless, exports are forecast lower than in 2001 due to increased world wheat production and stocks, and new wheat import duties in the EU (USDA-FAS, 2002).

The size of the market, along with a desire to continue favorable political relations with Russia, have made raw commodity and processed food exports to Russia an important issue for both U.S. agribusinesses and government agencies. Because U.S. agriculture depends on foreign markets to sustain profitability, U.S. exporters must assess means for rebuilding and expanding shipments of small grains and potatoes to Russia. This could be achieved through a combination of favorable economic adjustments in Russia and U.S. agricultural policies encouraging exports. Appropriate actions by either country could effectively result in increased Russian household (disposable) income and cheaper U.S. imports. To comprehend the magnitude of market potential requires an understanding of the desires and purchasing habits of Russian consumers. However, a paucity of detailed information on household expenditure patterns has been a hindrance to such market research in the past.

This study provides some insight into the demand for carbohydrate sources (i.e. grain-based products and potatoes) by households in eastern Russia. For decades, information on food demand at the household level was an unobservable phenomenon in Russia. The allotment system of communism did not allow for variations in food expenditures and consumption resulting from price and/or income responses. The move towards a free market system in Russia has made it possible to measure household expenditures on various items and examine the impacts of prices, household income and demographic differences on consumption patterns.

Data and Procedures

The data used for this analysis comes from a 1996 study of household expenditures in eastern Russia metropolitan areas. This data was gathered as part of a larger market study examining opportunities for exporting more U.S. rice to Russia. The survey was carried out in late February and March 1996.

Following the accepted survey protocol of focus interviews and testing of the survey instrument, a research design was developed focusing on eight major markets representative of the total market area of Siberia and the Russian Far East (RFE). Cities chosen for the survey were: Vladivostok (750,000), Khabarovsk (700,000),
Irkutsk (500,000), Ulan Ude (500,000), Krasnoyarsk (800,000), Novosibirsk (1,000,000), Omsk (1,000,000), and Tomsk (1,000,000); populations are shown in parentheses and are approximations. The American Business Center of Vladivostok contracted with Russians trained in interviewing to conduct the on-site interviews. Statistical determination of sample size necessary in each city revealed that 200 useable surveys would ensure response with 95% repeatability and a 4% margin of error in each city. Interviews were conducted in retail shops in middle-class neighborhoods. The intercept method was used to select respondents. All interviews were enumerated in Russian by Russians to avoid misinterpretation and limit bias. Inexpensive pens were given to survey respondents as a token of appreciation for their cooperation.

Average respondent age across the region was 36.34 years, ranging from 31.09 years in Ulan Ude to 41.26 years in Novosibirsk. Number of persons per household ranged from

3.28 in Novosibirsk to 3.99 in Tomsk and averaged 3.64 over the entire sample population. Average monthly income net of housing subsidies for the region was 1.74 million rubles per household. Households in Krasnoyarsk, Vladivostok, Khabarovsk and Irkutsk had monthly incomes of at least 2 million rubles; households in the remaining four cities had monthly incomes of less than 1.5 million rubles.

Respondents were asked about average weekly expenditures and quantities of 20 food items: beef, pork, chicken, fish, processed meats, eggs, cheese, milk, butter, fats and oils, sugar/candy, fresh fruits and vegetables, canned fruits and vegetables, potatoes, bread, flour, rice, pasta, other grains, and beverages (non-alcoholic). Weekly food expenditures averaged 679,172 R per household and ranged from 549,145 R in Novosibirsk to 858,310 R in Krasnoyarsk.

The purpose of this study was to examine the demand for carbohydrate sources by Russian households under the economic and political conditions faced by Russia since the demise of communism. Five commodity groups were used in this analysis: potatoes, bread, flour, rice, and pasta. Households providing appropriate responses to the survey indicated their average weekly expenditures and quantities for these commodities (Table 1).

To examine the expenditures on various carbohydrate sources by responding households, an almost ideal demand system (AIDS) model[4] was used (Deaton & Muellbauer, 1980). This model is an extension of the Working-Leser model for estimating Engel curves:

(1) $$w_i = \alpha_i + \beta_i \log(EXP)$$

where w_i = budget share; EXP = expenditures; and α_i and β_i are estimated parameters.

Deaton & Muellbauer (1980) argued that α_i and β_i in the Working-Leser model can be made functions of prices, thereby accounting for price effects if one wished to estimate Engel curves using time series data. The premise of the AIDS model stems from duality concepts that link expenditures (EXP) to a cost function. After derivation, the general AIDS model is denoted as a system of equations with the form:

(2) $$w_i = \alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i \log\left(\frac{EXP}{P}\right)$$

where P is a price index defined by the nonlinear equation:

(3) $$\log P = \tau_0 + \sum_k \tau_k \log p_k + \tfrac{1}{2}\sum_k \sum_j \delta_{kj} \log p_k \log p_j$$

The theoretical restriction of additivity is met by:

(4) $$\sum_k \alpha_k = 1, \ \sum_k \beta_k = 0, \ \sum_k \gamma_{kj} = 0$$

and homogeneity is satisfied if and only if:

(5) $$\sum_k \gamma_{jk} = 0$$

Symmetry is satisfied if:

(6) $$\gamma_{ij} = \gamma_{ji}$$

To circumvent the non-linearity of P that makes this demand system *almost* ideal, a linear approximation of P can be utilized, which Deaton and Muellbauer (1980) call the Stone Price Index:

$$(7) \qquad \log P^* = \sum_k w_k \log p_k \qquad P \cong P^*$$

which makes the price index (P) proportionally the same as some other price index (P*). The resulting model is now a *linear approximation* of the almost ideal demand system (LA/AIDS).

Deaton and Muellbauer (1980) also suggested that a scaling function can be interpreted as a measure of household size that take into account economies of household size which can be used to deflate total expenditures to reflect a "needs corrected per capita level" (p. 314). Since Russian households spend approximately half of their incomes on food (Shiptsova, Goodwin, and Holcomb, 2000), a household food demand is affected substantially by the amount of the people in the household. In this study, the demographic scaling procedure originally proposed by Barten (1964) is used of the household size variable. The original demand equations are:

$$(8) \qquad D_i = D_i(P, S, X), \qquad i = 1, \ldots, n$$

where D_i is per capita demand for the ith commodity, P is a vector of commodity prices, S is a vector of demographic variables, X is a given level of expenditure, and n is a number of commodities. The modified (scaled) system is:

$$(9)\qquad \begin{aligned} D_i(P,S,X) &= a_i D_i^*(p_1a_1, p_2a_2,\ldots,p_na_n, X) \\ &= a_i D_i^*(p_1^*, p_2^*,\ldots,p_n^*, X) \end{aligned}$$

where $p_i^* = a_i p_i$ are scaled prices and a_i are scaling parameters which are functions of demographic variables s_r, $r=1,\ldots,d$. When scaling a_i functions are the same for all commodities, they can be interpreted as reflecting the number of "equivalent adults" in the household. The following scaling functions are used in the estimation:

$$(10)\qquad a_i = a_i(s_1,\ldots,s_d) = \prod_r s_r^{\eta_{ir}}$$

This form of scaling function was previously employed by Green, Hoy, and McManus (1991) within the LA/AIDS model framework when estimating effects of advertizing on consumer demand. The homogeneity of degree zero constraint for demographic variables is imposed by

$$(11)\qquad \sum_i \eta_{ir} = 0, \qquad r = 1,\ldots,d$$

This procedure also allows for accounting for the economies of household size on the demand for carbohydrate sources.

Product prices were not provided by responding households; only quantities and expenditures for commodities were reported. Prices were therefore derived for consuming households by dividing expenditures (rubles) by quantities (kilograms) (Table 2). Not all of the 1,600 responding households reported average weekly purchases of each carbohydrate source. Average prices from consuming households were assigned as prices for households that did not report average weekly purchases so that as many observations as possible could be used in the demand estimations. Elementary statistics for prices are reported in Table 2.

As previously mentioned, some households responding to the average weekly food consumption/expenditure survey indicated no purchases of certain food items, possibly due to infrequent or sporadic purchasing of that commodity or no preference for that commodity. To circumvent censored response bias in this study, the consistent two-step (CTS) estimation procedure proposed by Shonkwiler and Yen (1999) was incorporated. As with the Heien and Wessells (1990) procedure (e.g. Heien and Wessells, 1990; Heien and Durham, 1991; Park *et. al*, 1996), the CTS procedure augments each equation in a demand system (the second step) using information gained from probit estimates (the first step). Drawing upon the mathematical notation used by Shonkwiler and Yen (SY), a system of equations with limited dependent variables can be denoted by:

$$
\begin{aligned}
&y_{ih}^{*} = f(x_{ih}, \beta_i) + \epsilon_{ih}, \qquad d_{ih}^{*} = z_{ih}'\alpha_i + \upsilon_{ih} \\
&d_{ih} = \begin{matrix} 1 & if\ d_{ih}^{*} > 0 \\ 0 & if\ d_{ih}^{*} \leq 0 \end{matrix} \qquad y_{ih} = d_{ih} y_{ih}^{*} \\
&(i = 1, \ldots, n; h = 1, \ldots, H)
\end{aligned} \tag{12}
$$

where *i* and *h* represent (respectively) equation number and household observation, y_{ih} and d_{ih} are observed dependent variables, y_{ih}* and d_{ih}* are corresponding latent variables, x_{ih} and

z_{ih} are vectors of exogenous variables, β_i and α_i are parameter vectors, and ε_{ih} and ν_{ih} are random errors. Continuing in the CTS procedure, maximum likelihood (ML) probit estimates of α_i were obtained for each of the *n* equations, where *n* represents a number of carbohydrate sources. The exogenous variables used in these probit estimations were household characteristics that might influence purchasing decisions, such as household size and income, binary variables representing households that own a garden, dummy variables for geographic location, discrete variables representing number of people in the household working in government, education, manufacturing industry, communications, or skilled trade; number of retired people in the household, and number of persons in other than that falling under the survey's category of "profession" (e.g. doctor, lawyer, engineer, etc.)[3].

Utilizing the cumulative distribution functions (CDF's) and standard normal probability density functions (PDF's) derived from probit estimations (Table 3), the second step of the CTS procedure could be performed. SY mathematically denote the augmented system of equations as:

(13) $$y_{ih} = \Phi(z_{ih}'\hat{\alpha}_i) f(x_{ih}, \beta_i) + \delta_i \phi(z_{ih}'\hat{\alpha}_i) + \xi_{ih}$$

where:

- Φ is standard normal CDF for each equation *i*,
- φ is standard normal PDF for each equation *i*,
- *i* is a carbohydrate source,

$z_{ih}^{'}$ is a column vector of explanatory variables for household *h* from probit model equations in (12)

$\hat{\alpha}_i$ is a vector of estimated parameters from probit model equations in (12)

The estimated equations for AIDS model therefore took on the form of[5]:

$$w_i = CDF_i \times \{\alpha_i + \sum_j \gamma_{ij}[\log p_j + \eta_j \log(HSIZE)] + \beta_i \log(EXP / P^*)] + \delta_{i18} PDF_i + \varepsilon_i \tag{14}$$

for each household, where:

w_i	is budget share of carbohydrate source i for i=1,...,5.
p_j	is price of carbohydrate source j for j=1,...,5.
EXP	is expenditures on all carbohydrates.
*P**	is Stone's approximation of the carbohydrates price index.
HSIZE	is household size
CDF_i	is standard normal CDF for each carbohydrate source *i* from equation (13), and
PDF_i	is standard normal PDF from equation (13).

The system was then estimated using the Full Information Maximum Likelihood (FIML) procedure in SAS. Theoretical restrictions (4) and (11) for homogeneity (in prices and the demographic variables) and (5) for symmetry (in prices only) were imposed, and the equation for pasta was dropped from the system of equations to avoid singularity of the variance covariance matrix of disturbance terms.

As pointed out in previous studies (Murphy and Topel, 1985; Shonkwiler and Yen, 1999), the use of maximum likelihood estimation in each step provides for consistent, albeit to some degree inefficient, parameter estimates. The incorporation of estimated δ's from the first step (in the CDF's and PDF's) introduces heteroskedasticity to the second step estimation, resulting in consistent but inefficient parameter estimates. Future econometric research is needed to develop an FIML procedure solving both steps simultaneously to address this efficiency issues.

Results

Parameter estimates and their associated t-statistics are reported in Table 4. It should be noted this study assumes these carbohydrate sources are separable from all other goods. Thus, the reported elasticities are conditional. As expected, own-price coefficients for all the carbohydrate sources are positive and significant, indicating that an increase (decrease) in product price increases (decreases) that source's share of total carbohydrate expenditures. Cross-price parameter estimates indicate that an increase (decrease) in the price of potatoes, flour and/or rice will result in a smaller (larger) share of carbohydrate expenditures for bread. Although this indicates that bread is a complement for potatoes, flour, and rice, the bread expenditure share does not significantly change with the price of pasta. This finding is plausible, as bread is a staple of virtually every meal and/or snack in Russia. The parameter estimates indicate that potatoes are complements with bread and pasta.

The β parameters (EXP, P) indicated some interesting findings for Russian households. As the households divert more rubles to carbohydrate expenditures, the share of budgeted carbohydrate expenditures for potatoes will rise. Conversely, the shares for rice and pasta decline, while the shares for bread and flour do not significantly change. These parameter estimates suggest that Russian households may welcome the opportunity to consume more potatoes if more rubles are available (and budgeted) for carbohydrate expenditures.

Price, household size, carbohydrate expenditure, and income elasticity estimates are reported in Table5. As suggested by the statistically significant parameter estimates in Table 4, the uncompensated cross-price elasticities indicate that bread is a net complement for potatoes, flour, and rice when both substitution and income effects are considered. This is no real surprise, as bread is generally consumed at every meal regardless of the other carbohydrate sources offered as part of the meal. Rice is a net complement for all carbohydrate sources but potatoes, whereas pasta is a net complement for potatoes and rice only.

Household size elasticity estimates also yielded some interesting insights. As expected, larger households spend more of their carbohydrate budget on pasta and the most commonly consumed and relatively inexpensive carbohydrate source – bread. Most of the pasta in the eastern Russia is low quality (mushy), and inexpensive, which makes it a more attractive carbohydrate source for large families with severe budget constraints. Conversely, the share of carbohydrate expenditures assigned to potatoes, flour, and rice decrease as household size increases. The decrease in budget share of potatoes in larger households is not a surprise since many households in Russia grow their own potatoes.

Expenditure elasticities ranged from 0.6 (rice) to 1.4 (potatoes). These elasticities indicate that a 1% increase in budgeted carbohydrate expenditures would result in increased potato consumption of almost 1.5%, with expenditures for bread and flour increasing near a proportional 1%. Smaller growths are evident in rice and pasta and rice (approximately 0.6%).

Income elasticities have been made available through the use of an auxiliary regression of carbohydrate expenditures on household income. Multiplying the expenditure elasticities by the income elasticity of carbohydrate expenditures gives the income elasticities for each carbohydrate source (Hyman and Shapiro, 1974; Manser, 1976; Capps, Tedford, and Havlicek, 1985; Park *et. al*, 1996). These income elasticities indicate that these carbohydrates are all normal goods. Furthermore, the fact that the income elasticities are near zero for rice and pasta provides evidence for the premise that these food sources are viewed as staple items by the households.

Implications

Basic food items such as potatoes, bread, flour, rice, and pasta products have been, and continue to be, the most often consumed food items in Russian households. An increase in income may result in these households dedicating a larger share of their expenditures to potatoes and a smaller share of their expenditures to pasta products. Buckwheat is another widely consumed carbohydrate source in Russia, however, it was not included in the survey and, therefore, could not be incorporated in the analysis.

Bread has a more elastic own-price demand than the other carbohydrate sources and was found in this study to be a net complement for potatoes. Further, the surveyed households were more inclined to allocate rubles for additional carbohydrate purchases to potatoes, followed by flour and bread. It may be that Russian households have become generationally dependent on bread and potatoes, thereby making rice and pasta less suitable substitutes for these food items. The importance of these foods to Russian consumers is evident by the government subsidization of bread and the recently growing imports of potatoes when even grain imports are declining (USDA-FAS, 1999a and 1999b).

Depending upon the strength of the Russian ruble, market opportunities may exist for U.S. grains and potatoes. For instance, Russia might choose to further expand live stock production and allocate a large portion of domestically produced grains to feed. That would trigger an increase in import of higher quality grains that could be used for bread production. Availability of grains and potatoes from the European Union, along with the rice supplied by Pacific Rim countries, will determine the ability of U.S. exporters to capture a larger share of Russian markets for carbohydrates. Likewise, commodity availability from Europe and Asia may impact the ability of the U.S. to politically bargain through the use of food aid programs.

Endnotes

1. Source: Russian-European Centre for Economic Pollicy (RECEP) at http://www.recep.org/.

2. Source: State Committee of the Russian Federation on Statistics at http://www.gks.ru/eng/.

3. The results for the Probit equations estimation in (12) can be obtained from the authors.

4. Weak separability was assumed. This assumption may be tested using the procedures outlined by Nayga and Capps (1994), Eales and Unnevehr (1988).

5. Other demographic variables such as location and profession were initially considered in the estimation. However, these household characteristics have been incorporated in the estimations of the CDF and PDF per Shonkiwiler and Yen. Thus, they were not included in the final demand specifications.

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Table 1: Descriptive Statistics for Carbohydrate Expenditures and Quantities, Weekly Income, and Household Size for Responding Russian Households[a].

Variable	Mean	Standard Deviation	Minimum	Maximum
Potatoes				
Expenditure (rubles)	9,685.0	15,578.0	0	200,000
Quantity (kg)	4.43	6.09	0	50.00
Bread				
Expenditure (rubles)	18,000.0	17,962.0	0	150,000
Quantity (kg)	6.40	6.78	0	75.00
Flour				
Expenditure (rubles)	5,296.2	9,936.3	0	225,000
Quantity (kg)	1.39	2.41	0	50.00
Rice				
Expenditure (rubles)	3,764.3	4,754.0	0	60,000
Quantity (kg)	0.73	0.94	0	12.00
Pasta				
Expenditure (rubles)	5,715.2	6,671.4	0	70,000
Quantity (kg)	0.96	1.19	0	15.20
Weekly Income	427,810	781,130	16,154	23,077,000
Household Size	3.64	1.43	1	9

[a] Number of observations is 1372 after dropping those households that did not indicate their income and/or food expenditure, and the households with annual income over 50 million R.

Table 2: Descriptive Statistics for Imputed Carbohydrate Prices (ruble/kg) Paid by Responding Russian Households[a].

Variable	Mean	Standard Deviation	Minimum	Maximum
Potatoes	2.4980	2.4863	0.1333	60.0000
Bread	3.1867	2.6342	0.1476	35.0000
Flour	4.1316	2.9806	0.3000	50.0000
Rice	5.8030	4.4640	0.3000	50.0000
Pasta	6.5607	3.5598	0.4000	80.0000

[a] Number of observations is 1372 after dropping those households that did not indicate their income and/or food expenditure, and the households with annual income over 50 million R.

Table 3: Mean Values of Cumulative Distribution Functions (CDF's) and Standard Normal Probability Density Functions (PDF's) From the First-Step Probit Regressions[a].

Carbohydrate Source	CDF	PDF
Potatoes	0.5746 (0.0954)	0.4200 (0.0262)
Bread	0.8778 (0.0499)	0.9068 (1.0696)
Flour	0.6672 (0.0997)	0.6221 (5.9486)
Rice	0.7323 (0.0695)	1.0727 (21.863)
Pasta[b]	0.7570 (0.0798)	0.5914 (1.7237)

[a] Numbers in parentheses represent standard deviations. Number of observations was 1,372.

[b] The CDF and PDF for pasta were not used in the second-step estimation because the equation for pasta was dropped to avoid singularity of the variance-covariance matrix of disturbance terms.

Table 4: Parameter Estimates for the LA/AIDS Carbohydrates Model (t-statistics in parentheses).

	Carbohydrate Sources				
Explanatory Variables	**Potatoes**	**Bread**	**Flour**	**Rice**	**Pasta**
Log($P_{Potatoes}$)	0.1128* (9.1132)	-0.0403* (-3.3656)	-0.0099 (-0.9430)	-0.0129 (-1.4481)	-0.0497* (-4.5539)
Log(P_{Bread})	-0.0403* (-3.3656)	0.0882* (6.9863)	-0.0232* (-3.0227)	-0.0171* (-2.7235)	-0.0075 (-0.9596)
Log(P_{Flour})	-0.0099 (-0.9430)	-0.0232* (-3.0227)	0.0645* (6.6150)	-0.0216* (-2.4392)	-0.0098 (-0.9992)
Log(P_{Rice})	-0.0129 (-1.4481)	-0.0171* (-2.7235)	-0.0216* (-2.4392)	0.0763* (9.1674)	-0.0248* (-3.0035)
Log (P_{Pasta})	-0.0497* (-4.5539)	-0.0075 (-0.9596)	-0.0098 (-0.9992)	-0.0248* (-3.0035)	0.0918* (7.8776)
Log(EXP/P*)	0.1309* (12.7478)	0.0010 (0.1354)	0.0045 (0.9409)	-0.0496* (-12.7848)	-0.0868* (-14.2305)
HSIZE	-0.5486* (-4.0063)	0.0967 (0.6708)	0.0066 (0.0379)	0.0358 (0.3249)	0.4096* (2.7274)
PDF	0.3131* (7.1361)	0.5583* (8.5346)	0.0169 (0.5009)	0.0444 (0.9443)	-0.9328* (-12.0005)
Constant	0.0253 (0.7412)	0.3508* (13.5510)	0.1547* (5.0119)	0.2059* (6.7311)	0.2634* (5.8324)

* Statistically significant at the α=0.05 level.

Table 5: **Price[a], Household Size[b], Expenditure[c], and Income[d] Elasticities for Carbohydrate Sources.**

Elasticity	Carbohydrate Source				
	Potatoes	Bread	Flour	Rice	Pasta
Potatoes	-0.6738	-0.1166	-0.0286	-0.0373	-0.1436
Bread	-0.0814	-0.8221	-0.0469	-0.0345	-0.0152
Flour	-0.0572	-0.1341	-0.6275	-0.1246	-0.0566
Rice	-0.0945	-0.1251	-0.1582	-0.4409	-0.1814
Pasta	-0.2524	-0.0383	-0.0498	-0.1258	-0.5337
HSIZE	-0.2506	0.0541	-0.0068	-0.0156	0.3210
Expenditure	1.3783	1.0020	1.0262	0.6364	0.5591
Income	0.1790	0.1301	0.1333	0.0826	0.0726

[a] $\varepsilon_{ii} = -\delta_{ij} + \gamma_{ij}(CDF_i / w_i)$, where $\delta_{ij} = 1$ if i=j, zero otherwise

[b] $\pi_i = (\Sigma\gamma_{ij}\eta_j)*(CDF_i/w_i)$

[c] $\mu_i = 1 + \beta_i\ (CDF_i/w_i)$

[d] From multiplying μ_i by the income elasticity of carbohydrate expenditures.

HOUSEHOLD EXPENDITURE PATTERNS FOR CARBOHYDRATE SOURCES IN RUSSIA

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Abstract: This study provides a unique view of the demand for carbohydrate sources in Russia at the household level. The data used in this analysis was obtained from a 1996 survey in eight Russian metropolitan areas. An AIDS model is used to examine the expenditures for potatoes, bread, flour, rice, and pasta. The impacts of household demographic factors on the consumption of carbohydrates are also discussed.

Key words: carbohydrate sources,, consumer demand, demographic variables, household survey, Russia, Shonkwiler and Yen consistent two-step estimation procedure.

Household Expenditure Patterns
For Carbohydrate Sources in Russia

The volatile nature of the Russian political and economic system in recent years has brought about severe changes in the availability of food for consumers. Russia has experienced a staggering 35% year-to-year drop in forecast grain (primarily wheat) availability during the past 5 years, partially due to adverse weather conditions and in part due to the virtual elimination of grain exports. Imports of processed food have likewise been decimated since the devaluation of the ruble in August 1995. Reduced purchasing power has forced Russian consumers to rely more on basic food items such as bread, but the declining availability of grain has made even these "cheap" energy sources more expensive (USDA-FAS, 1998).

The economic crisis of 1998 triggered hyperinflation in Russia. From September 1998 to August 1999, the nominal price of wheat (in rubles) in Russia nearly tripled, going from 1,020 R to 3,010 R ($80 to $124) for metric ton. Similarly, the nominal price of top-grade flour more than doubled during this time period, from 3,380 R to 7,005 R. These prices continued to rise even though the production and import projections for 1999 were higher than in previous years (USDA-FAS, 1999a). The consumer price index (CPI) increased by 120% during the period of September 1998 through August 1999, where as food and beverages price index by 140% during the same time period[1]. That was a big increase in the rate of inflation compared to 1996 and 1997 when CPI rose only 20% and 10% respectively[2]. Inflation slowed down again in 1999. The CPI rose 40% and 20% in the of Russian markets for carbohydrates. Likewise, commodity availability from Europe and Asia may impact the ability of the U.S. to politically bargain through the use of food aid programs.

Footnotes

1. Source: Russian-European Centre For Economic Policy (RECEP) at http://www.recep.org/.
2. Source: State Committee of the Russian Federation on Statistics at http://www.gks.ru/eng/.
3. The results for the Probit equations estimation in (12) can be obtained from the authors.
4. Weak separability was assumed. This assumption may be tested using the procedures outlined by Nayga and Capps (1994), Eales and Unnevehr (1988).
5. Other demographic variables such as location and profession were initially considered in the estimation. However, these household characteristics have been incorporated in the estimations of the CDF and PDF per Shonkiwiler and Yen. Thus, they were not included in the final demand specifications.