Primary Agricultural Product Demand in Post-Communist Russia

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ABSTRACT

This study examines food consumption patterns for households in Siberian Russia. The study is based on a survey conducted by the American Business Center in Vladivostok in February/March 1996. When incomes grow, households tend to include greater proportions of livestock products in their diets. That leads to a corresponding increase in indirect cereal consumption. Alternative measures of food consumption employed in the analysis are expenditures and calories. The results show that the expenditure income elasticity of cereal products is positive whereas income elasticities of cereal products are zero for calorie measures, implying demand for service from non-agricultural sectors. The elasticities of total food and animal product consumption are positive for both measures. Stabilization of transition economies might lead to a substantial increase in indirect cereal consumption, which, in turn, would lead to a dramatic increase in demand for agricultural imports. [EconLit citations: L660, D120, Q180.] © 2004 Wiley Periodicals, Inc.

1. INTRODUCTION

This report examines food consumption patterns in a poorly understood sub-region of the largest economy of transition, Siberian Russia. When incomes grow, households tend to include greater proportions of livestock products in their diets. That leads to a corresponding increase in indirect cereal consumption. Alternative measures of food consumption employed in the analysis are expenditures and calories. The results show that the expenditure income elasticity of cereal products is positive whereas income elasticities of cereal products are zero for calorie measures, implying demand for service from non-agricultural sectors. The elasticities of total food and of animal product consumption are positive for both measures. Stabilization of transition economies might lead to a substantial increase in indirect cereal consumption, which, in turn, would lead to a dramatic increase in demand for agricultural imports.
Food demand is a complex dynamic process that depends on various factors. For example, at low-income levels, diets are composed mostly of cereals with only small quantities of livestock products. In general, meat products are more efficient sources of protein but require more production resources than proteins from crops (Thomson, 1974). As incomes grow, consumers tend to include greater proportions of livestock products in the diet. The resulting decline in the proportion of starchy staples in the diet is known as “Bennett’s Law” (Bennett, 1954). Bennett’s law holds for both a country’s aggregate consumption and individual household consumption. In fact, in developing economies, agricultural production growth might not keep pace with consumption needs. Countries with low self-sufficiency ratios have to rely on agricultural imports to satisfy domestic food demand (Rask, 1991), especially demand for high-value meat products.

It is of interest to examine demand for cereal in a country in economic transition where the economy has been distorted by the Communist rule for decades and does not fall into either the “developing” or “developed” category.¹ The purpose of this report is not to predict income change in Russia, but to analyze the expected effects of change in income on food demand. Such expected effects may be estimated through simulation utilizing anticipated economic growth figures for Russia from secondary sources.

Previous studies of Russian food consumption have focused on overall food consumption in Russia (Elsner, 1999). However, Siberian Russia is interesting to analyze in a separate study for two reasons. First, Siberia may be a separate market from European Russia, particularly in cities in the Far East, like Vladivostok or Irkutsk. Second, because incomes are generally lower in Siberian than in European Russia, the potential for growth in high value food consumption, particularly mean, may be relatively larger. The population in Siberia is 19.2% of the total population of Russia, and total meat consumption in Siberia is 18.7% of total meat consumption (Goskomstat).

The breakup of the Soviet Union in 1991 put an end to the rule in that region of the world. The volatile nature of the Russian political and economic system after the breakup of the Soviet Union has brought about dramatic changes in food availability for consumers. Russian food marketing and distribution systems have struggled to provide citizens with staple food items. Changing Russian trade policies have allowed for relatively more expensive imported meat and grain products, which are generally of higher quality. In the most recent years, Russia has experienced an economic turnaround. 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 the European Union and the United States.

Russia’s livestock sector is beginning a slow turnaround, as wealthy enterprises and the government are giving support to the meat production sector. For the first time in over a decade, swine numbers were expected to grow in 2002, albeit modestly. Although cattle numbers continue to decline, they are falling at a slower rate than several years ago, and are expected to stabilize in the near future as a result of government support and domestic production growth.

¹ According to World Bank classification, low-income economies are those with a GNP per capita of $785 or less in 1996. Middle-income economies are those with GNP per capita of more than $785 but less than $9,636. Lower-middle-income and upper-middle-income economies are separated at GNP per capita of $3,115. High-income economies are those with a GNP per capita of $9,636 or more. Low-income and middle-income economies are sometimes referred to as developing economies. The use of the term is convenient; it is not intended to imply that all economies in the group are experiencing similar development or that other economies have reached a preferred or final stage of development. Classification by income does not necessarily reflect development status. For more information see http://www.worldbank.org/data/archive/wdi/wdi-guid.htm#wb_class
investment. Poultry production in Russia was expected to grow by 7% in 2002, as a consequence of the plentiful availability of inexpensive feed from the 2001 grain harvest, and as financially rich Russian oil, energy, and metals enterprises enter the domestic agricultural sector. However, long-term production is not expected to improve rapidly due to internal structural problems.

Although Russia’s demand for imported higher priced meat is weakening, the strong overall demand for imported products is expected to continue in the near future. Russia’s livestock production and meat-processing sectors still have a long way to go to meet domestic demand. Therefore, it is anticipated that suppliers of inexpensive meat products will continue to do well in the Russian market in the coming years (USDA-FAS, 2002). Poultry imports surpassed 1.3 million metric tons during 2001, as Russian consumer demand for poultry continued to expand, partially precipitated by sharp price increases for competing beef and pork products. Consumption of beef and pork in Russia are forecast to decrease in 2003 because new livestock import quotas limit the ability of imports to fill the gap in domestic supply of meat products. A similar decrease may be seen for poultry depending upon results of Russian inspections of U.S. poultry-processing facilities and import restrictions imposed on that sector. As demand is expected to exceed supply in 2003, a rise in the price of all meats is expected (USDA-FAS, 2003; Osborne, 2003).

For almost a century, 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 consumption of various items, examine the change in household diet, and quantify the impacts of household income and demographic differences on consumption patterns. This research focuses on change in consumer diets of households in Siberian Russia with respect to their incomes. The study utilizes a unique primary data set from a survey conducted in Siberia and the Russian Far East in 1996. Income elasticities of expenditures are estimated for starchy staples, animal products, and total food. Food consumption is being measured in expenditures and calories. Positive calorie income elasticities may be thought of as an indicator of quality and/or convenience. The results of the study provide insight on food consumption patterns in this economy in transition, with particular implications for increased trade of high-value meat products. The Heckman two-step procedure is employed to account for non-response.

2. DATA

The data used for this analysis comes from a study of average weekly household expenditures in eight metropolitan areas in Siberia and the Russian Far East. 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 early March 1996.

Following the accepted survey protocol of focus interviews and testing of the survey instrument, a research design was developed to focus on eight major metropolitan areas

\footnote{This is usually referred to as Bennett’s law that states that the proportion of starchy staples in the diet declines as income rises, i.e., income elasticity of food quality is greater than zero.}

\footnote{Convenience or time component of food demand will be addressed later in this report.}
representative of the total market area of Siberia and the Russian Far East (RFE). Cities surveyed 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); approximate populations are shown in parentheses. The American Business Center of Vladivostok contracted Russians trained in interviewing to conduct the on-site interviews.

Statistical determination of sample size necessary in each city revealed that 200 usable surveys would ensure a response rate with 95% repeatability and a 4% margin of error in responses in each city. Interviews were conducted in retail shops in middle-class neighborhoods. The intercept method was used to identify respondents whereby they were systematically selected from shoppers at these sites. All interviews were enumerated in Russian by Russians to avoid misinterpretation and limit bias.

Respondents were asked to provide measures of their average weekly expenditures for 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). Households were asked to report amounts (in rubles per month) spent on housing and placed in savings. Means of expenditures on food and housing, along with savings, monthly income, and household size are reported in Table 1. Over 80% of the households surveyed received housing or bread subsidies.

Because food is a composite commodity, various food items are usually aggregated into different groups and subgroups (e.g., total food, cereal and meat products, vegetables) for empirical study. Most studies used food expenditures (Blandford, 1984; Jureen, 1956; Marks & Yetley, 1988) and calories (Jureen, 1956; Houthakker, 1957, 1965; Ohri-Vachaspati, Lorge, & Goldberg, 1998; Dawson & Tiffin, 1998) to aggregate food items to determine the relationship between food consumption and per capita income. The expenditure measure approach does not separate the demand for agricultural and non-agricultural sector services; therefore, this measure overestimates the demand for primary agricultural products because expenditures include services from the non-agricultural sector. Food expenditure levels can also be affected positively by food price policies in the country. The expenditure measure is based on food price, i.e., the sum of the farm price of and marketing bill for each product.

Calorie measures allow for estimation of farm product demand separate from non-agricultural service demand. Non-agricultural service includes both food quality and convenience. The issue of convenience has been addressed in the literature on the time production time have a significant influence on their food expenditures. Employed wives buy more prepared foods but not more away-from-home meals, while education appears to decrease the demand for prepared foods.

Table 2 presents average per capita cereal consumption in the world, developed and developing countries. Indirect cereal consumption is calculated using a cereal equivalent (CE) measure. Similar to the calorie measure, CE measures allow for estimation of farm
## TABLE 1. Descriptive Statistics for Responding Households, Combined and by City

<table>
<thead>
<tr>
<th></th>
<th>Eight Cities</th>
<th>Irkutsk</th>
<th>Khabarovsk</th>
<th>Ulan Ude</th>
<th>Vladivostok</th>
<th>Krasnoyars</th>
<th>Novosibirsk</th>
<th>Tomsk</th>
<th>Omsk</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Income (rubles)</strong></td>
<td>1,743,705</td>
<td>2,213,413</td>
<td>2,137,665</td>
<td>1,350,695</td>
<td>2,214,552</td>
<td>2,051,429</td>
<td>1,478,499</td>
<td>1,300,395</td>
<td>1,198,727</td>
</tr>
<tr>
<td><strong>Household size</strong></td>
<td>3.63</td>
<td>3.52</td>
<td>3.48</td>
<td>3.82</td>
<td>3.58</td>
<td>3.73</td>
<td>3.28</td>
<td>3.99</td>
<td>3.65</td>
</tr>
<tr>
<td><strong>Food expenditures</strong></td>
<td>679,172</td>
<td>683,844</td>
<td>693,284</td>
<td>592,861</td>
<td>806,302</td>
<td>858,310</td>
<td>549,145</td>
<td>651,778</td>
<td>588,404</td>
</tr>
<tr>
<td><strong>Savings</strong></td>
<td>60,866</td>
<td>150,302</td>
<td>0</td>
<td>74,010</td>
<td>70,943</td>
<td>91,464</td>
<td>48,600</td>
<td>23,868</td>
<td>23,969</td>
</tr>
<tr>
<td><strong>Housing expenditures</strong></td>
<td>73,556</td>
<td>72,853</td>
<td>112,053</td>
<td>56,535</td>
<td>95,524</td>
<td>84,288</td>
<td>64,267</td>
<td>61,063</td>
<td>40,752</td>
</tr>
<tr>
<td><strong>Food share</strong></td>
<td>0.47</td>
<td>0.36</td>
<td>0.41</td>
<td>0.50</td>
<td>0.47</td>
<td>0.51</td>
<td>0.42</td>
<td>0.53</td>
<td>0.54</td>
</tr>
<tr>
<td><strong>Savings share</strong></td>
<td>0.04</td>
<td>0.08</td>
<td>0.00</td>
<td>0.04</td>
<td>0.05</td>
<td>0.05</td>
<td>0.03</td>
<td>0.01</td>
<td>0.02</td>
</tr>
<tr>
<td><strong>Housing share</strong></td>
<td>0.05</td>
<td>0.04</td>
<td>0.08</td>
<td>0.05</td>
<td>0.06</td>
<td>0.06</td>
<td>0.05</td>
<td>0.06</td>
<td>0.04</td>
</tr>
</tbody>
</table>
product demand separate from non-agricultural service demand. Data in Table 2 indicate that indirect cereal consumption is much higher in the developed than developing world. This reflects changes in consumer diets at different levels of income. This report examines the effects of changing diet composition of Russian households on the demand for primary agricultural products. Income elasticities of food demand were estimated using the alternative food-consumption measures of expenditures and calories.

3. METHODS

Not all households in the survey reported their average weekly food expenditures. To account for these censored responses for food expenditures, a Heckman two-step procedure was employed. The first step of this procedure is a probit regression to determine the probability that a household \( h \) would purchase food during the survey period. The probability is mathematically denoted as:

\[
Pr[Z_h = 1] = \Phi(W_h \delta) \quad h = 1, \ldots H
\]

where \( Z_h \) is the probability that the household made expenditures; \( \Phi \) is the cumulative distribution function (CDF); \( W_h \) is vector of regressors related to the purchase decision; and \( \delta \) is the coefficient vector associated with these regressors. 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.). The inverse Mills ratio for each household was estimated from the probit regressions, denoted as:

\[ \text{Inverse Mills ratio} \]

TABLE 2. Per Capita Cereal Consumption in 1996

<table>
<thead>
<tr>
<th></th>
<th>Weight (kilograms)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Direct</td>
</tr>
<tr>
<td>World</td>
<td>880</td>
<td>641</td>
</tr>
<tr>
<td>Developing economies(^a)</td>
<td>1,428</td>
<td>288</td>
</tr>
<tr>
<td>Developed economies</td>
<td>418</td>
<td>162</td>
</tr>
</tbody>
</table>

Note. Cereals include wheat, rice, barley, rye, oats, millet, bran, and other cereals. Source: FAO Food Balance Sheet at http://apps.fao.org/page/collections?subset=agriculture and cereal equivalent measure was employed for calculating indirect cereal consumption.

\(^a\)Classification of developing and developed economies follows the FAO classification at http://apps.fao.org/page/collections?subset=agriculture.

\(^4\)The cereal equivalent measure is a composite measure to determine the effect of changing diet composition on primary agricultural product demand by converting various food items into a common unit (Lin, 1990; Rask, 1986), e.g., cereal equivalence. It incorporates diet upgrades by applying this concept to measure the total input of grain equivalents necessary to produce the livestock products consumed (Rask, 1986). The CE measure may overestimate demand for indirect cereal in some countries where livestock is fed by forage.

\(^5\)The results for the Probit equation (1) estimation can be obtained from the authors.
where $\phi$ represents the probability distribution function (PDF). The inverse Mills ratio was then used to incorporate the censoring latent variable in the estimation of Engel curves. By doing so, the demand estimations could incorporate all useable observations. The following double logarithmic functional form was estimated:

$$
\hat{MR}_h = \begin{cases} 
\frac{\phi(W_0 \delta)}{\Phi(W_0 \delta)} & \text{for } Z_h = 1 \\
\end{cases}
$$

(2)

Because binary variables were incorporated, a base was determined for the models. The base household was one located in Tomsk. Parameters for equation (3) were estimated using SAS. The equations were estimated using different measures of a food item, expenditures, calorie, and cereal equivalents. Three different food items were considered: total food (FOOD), animal products (AP), and starchy staples (SS). Animal products were comprised of beef, pork, chicken, luncheon meats and sausages, fats, eggs, and dairy products. Starchy staples were comprised of potatoes, bread, flour, rice, pasta products, vegetables, and other cereals. Total food was comprised of animal products, starchy staples,
sugar and beverages (including alcoholic). The cereal conversion ratio of Rask (1986) was employed.

An alternate way to estimate the distance between the income elasticity of expenditure and that of quantity is to simply subtract the log of calorie consumption from the log of expenditures in the following way:

\[
\text{LEXP}_{ih} - \text{LCAL}_{ih} = \gamma_0 + \gamma_1 \text{LINC}_h + \gamma_2 \text{LHSIZE}_h + \gamma_3 \text{IRKUTSK}_h + \gamma_4 \text{KHABAR}_h + \gamma_5 \text{ULAN}_h + \gamma_6 \text{VLADI}_h + \gamma_7 \text{KRASN}_h + \gamma_8 \text{NOVO}_h + \gamma_9 \text{OMSK}_h + \gamma_{10} \text{MR}_h + e_h,
\]

\[
i = \text{FOOD}, \text{AP}, \text{SS}
\]

where \(\text{LEXP}_{ih}\) and \(\text{LCAL}_{ih}\) are logs of expenditures and calories, respectively, for item \(i\) for household \(h\). This approach captures the response of the unit price paid per calorie to changes in income. To the extent that an increase in the unit price paid per calorie represents an improvement in consumption of non-agricultural services (or “quality,” for brevity), the measurement can be thought of as an indicator of the elasticity of demand for quality as income increases.

4. RESULTS

Results for the estimated double-log functional form (equation 3) are presented in Tables 3–5. Average weekly food expenditures and income were measured in millions of rubles and calories represent average weekly consumption measured as kilocalories. \(^6\) To verify whether the “quality” income elasticities were positive, the logs of calorie consumption were subtracted from the log of expenditures and used as dependent variables by substituting these log differences for each of food item in equation 3 (starchy staples, animal products, and total food).

Results indicate that income coefficients are positive and significant for all food items if measured in expenditures. However, when consumption is measured in calories, income coefficients for starchy staple consumption are insignificant (Table 5), indicating that people are paying only for non-agricultural sector service when increasing expenditures on cereals as incomes rise. The results suggest that Siberian and Russian Far East households are saturated with cereals in terms of quantity consumed and are willing to pay more for quality and convenience as their incomes increase. Income coefficients of demand for animal products and total food are always positive and significant regardless of the measure.

To test the robustness of the estimates for price and “quality” income elasticities, the log differences from equation 4 are estimated. These estimates are shown in the right-hand columns of Tables 3–5. The income coefficients are positive and significant for total food, animal products, and cereals, indicating that income elasticities for unit prices are positive; this supports the assertion of positive “quality” income elasticities. Apparently, Russian consumers are ready to pay for non-agricultural services (e.g., convenience) provided sufficient increases in income.

\(^6\) The results for semi-log functional form and for the cereal equivalent measure are available from the authors.
The implications of the model are summarized in Table 6, where the predicted food consumption increases are presented as a percentage of total food consumption per household. GDP growth in Russia for the period 1997 through 2002 ranged between 0.9 and 9.0%, the exception being 1998 when, due to the economic crisis, the GDP growth was a negative 4.9%. Simulated changes in food expenditures resulting from employing these GDP changes ranged from 0.3–2.7%, again the exception being 1998. In this year, the economic decline resulted in a 1.5% decrease in food expenditures. Changes in estimated weekly per household food expenditures are also shown in terms of March 1996 rubles.

### TABLE 3. Parameter Estimates from Double Log Model for Total Food Demand Measured in Expenditures, Calories, and Log Difference Between the Two Expenditure | Calorie | Expenditure/calorie
--- | --- | ---
LINC | 0.305** | 0.122** | 0.1819**
| (12.8769) | (5.2238) | (11.3440)
LHSIZE | 0.2657** | 0.3790** | -0.1012**
| (8.7297) | (12.5767) | (-4.0885)
IRKUTSK | 0.3710** | -0.0338 | 0.3781**
| (4.9501) | (-0.4561) | (3.7313)
KHABAR | 0.0962 | -0.4254** | 0.4867**
| (1.0875) | (-4.8596) | (3.5686)
ULAN | 0.2967** | -0.1263 | 0.3759**
| (3.3605) | (-1.4446) | (2.9480)
VLADI | 0.4016** | 0.1130* | 0.2861**
| (6.1874) | (1.7578) | (5.0756)
KRASN | 0.1661** | -0.1950** | 0.3212**
| (2.0208) | (-2.3964) | (2.7836)
NOVOS | -0.1027 | -0.4291** | 0.2824*
| (-1.1062) | (-4.6700) | (1.9540)
OMSK | 0.1419** | -0.0328 | 0.1330**
| (2.2130) | (-0.5162) | (2.2354)
MR | -1.1156** | -2.2685** | 0.9250
| (-2.3429) | (-4.8121) | (1.0261)
CONSTANT | -1.4268** | 9.2916** | -10.6523
| (-11.0511) | (72.6893) | (-45.3744)
R² | 0.2978 | 0.2179 | 0.2552

*Statistically significant at the $\alpha = 0.10$ level.
**Statistically significant at the $\alpha = 0.05$ level.

5. CONCLUSIONS AND IMPLICATIONS

Analysis of household data in Siberian Russia indicates that the elasticity of total food and of animal product consumption measured in expenditures or calories is positive. In addition, the elasticity of starchy staple consumption measured in expenditures is positive, whereas the elasticity of cereal staple consumption is zero if measured in calories. The difference implies demand for service from non-agricultural sectors, meaning the expenditure income elasticity of cereal products is positive in spite of the zero income
elasticities for the calorie measure. Increased consumption of animal products is the principal reason for the increase in per capita total food consumption associated with increases in per capita income.

It is generally understood that income growth is the major factor that triggers dietary change at low- and middle-income levels for both individual households and a country as whole. That is, the food consumption level for an individual is determined by the individual’s income and prices, in conjunction with the individual’s tastes and preferences. Previous studies showed that in developed countries, income elasticities of demand for cereal products measured by cereal equivalents (or calories) are negative and relatively small. The income elasticity of demand for cereal products measured by expenditures is positive as income increases. This reflects the effect of continuously increasing demand for non-agricultural services. Results of this study show that demand for starchy staples measured in cereal equivalence or calories in a country in transition are zero, consistent with the state of the economy in transition. Cereal consumption, when separated from non-agricultural sector services, neither increases nor decreases in a transition economy. Households, therefore, are paying for non-agricultural sector services.

Depending on future developments in countries with transition economies, indirect cereal consumption (dairy and meat products and fish) will likely change in accordance with their per capita income. Stabilization of transition economies may lead to a
guarantees and export assistance programs is an effective way to promote increased exports to these transition economies.

For exporting countries, lowering prices through the government programs such as loan guarantees and export assistance programs (GSM 102 and 103) of animal products, feed grains, or non-feed grains (depending on the importing country production preferences) is an effective way to promote increased exports to these transition economies.

TABLE 5. Parameter Estimates From Double Log Model for Starchy Staples Demand Measured in Expenditures, Calories, and Log Difference Between the Two

<table>
<thead>
<tr>
<th></th>
<th>Expenditure</th>
<th>Calorie</th>
<th>Expenditure/calorie</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINC</td>
<td>0.1883**</td>
<td>0.0395</td>
<td>0.1375**</td>
</tr>
<tr>
<td>(6.6360)</td>
<td>(1.2872)</td>
<td>(6.3794)</td>
<td></td>
</tr>
<tr>
<td>LHSIZE</td>
<td>0.3072**</td>
<td>0.4681**</td>
<td>-0.1231**</td>
</tr>
<tr>
<td>(8.4316)</td>
<td>(11.8729)</td>
<td>(-3.7014)</td>
<td></td>
</tr>
<tr>
<td>IRKUTSK</td>
<td>0.0602</td>
<td>-0.1626*</td>
<td>0.0030</td>
</tr>
<tr>
<td>(0.6710)</td>
<td>(-1.6750)</td>
<td>(0.0217)</td>
<td></td>
</tr>
<tr>
<td>KHABAR</td>
<td>0.0179</td>
<td>-0.4684**</td>
<td>0.1906</td>
</tr>
<tr>
<td>0.1695</td>
<td>(-4.0898)</td>
<td>(1.0396)</td>
<td></td>
</tr>
<tr>
<td>ULAN</td>
<td>0.0368</td>
<td>-0.2790**</td>
<td>0.0174</td>
</tr>
<tr>
<td>(0.3484)</td>
<td>(-2.4395)</td>
<td>(0.1018)</td>
<td></td>
</tr>
<tr>
<td>VLADI</td>
<td>0.4075**</td>
<td>0.1311</td>
<td>0.3449**</td>
</tr>
<tr>
<td>(5.2456)</td>
<td>(1.5595)</td>
<td>(4.5531)</td>
<td></td>
</tr>
<tr>
<td>KRASN</td>
<td>0.0432</td>
<td>-0.3148**</td>
<td>0.0907</td>
</tr>
<tr>
<td>(0.4395)</td>
<td>(-2.9573)</td>
<td>(0.5846)</td>
<td></td>
</tr>
<tr>
<td>NOVOS</td>
<td>-0.2451**</td>
<td>-0.5268**</td>
<td>-0.0474</td>
</tr>
<tr>
<td>(-2.2066)</td>
<td>(-4.3824)</td>
<td>(-0.2438)</td>
<td></td>
</tr>
<tr>
<td>OMSK</td>
<td>-0.0072*</td>
<td>-0.1662**</td>
<td>0.0159</td>
</tr>
<tr>
<td>(-0.0942)</td>
<td>(-2.0010)</td>
<td>(0.1988)</td>
<td></td>
</tr>
<tr>
<td>MR</td>
<td>-1.1323**</td>
<td>-2.4736**</td>
<td>-0.6677</td>
</tr>
<tr>
<td>(-1.9868)</td>
<td>(-4.0108)</td>
<td>(-0.5511)</td>
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<tr>
<td>CONSTANT</td>
<td>-2.8448**</td>
<td>8.3012**</td>
<td>-10.6228**</td>
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<tr>
<td>(-18.4102)</td>
<td>(49.6418)</td>
<td>(-33.6684)</td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>0.1620</td>
<td>0.1434</td>
<td>0.1465</td>
</tr>
</tbody>
</table>

*Statistically significant at the α = 0.10 level.
**Statistically significant at the α = 0.05 level.

considerable increase in demand for meat and cereal products in these countries, which may have to rely heavily on agricultural imports in the near future to meet these demands. For exporting countries, lowering prices through the government programs such as loan guarantees and export assistance programs (GSM 102 and 103) of animal products, feed grains, or non-feed grains (depending on the importing country production preferences) is an effective way to promote increased exports to these transition economies.

TABLE 6. Predicted Average Percentage and Actual Changes in Household Weekly Food Expenditures Rubles Valued on March 1996 Basis

<table>
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<tr>
<td>Annual GDP growth (%)a</td>
<td>0.9</td>
<td>-4.9</td>
<td>5.4</td>
<td>9.0</td>
<td>5.0</td>
<td>4.0</td>
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<tr>
<td>Annual food expenditure growth (%)</td>
<td>.3</td>
<td>-1.5</td>
<td>1.6</td>
<td>2.7</td>
<td>1.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Annual food expenditure (rubles)b</td>
<td>699,600</td>
<td>689,000</td>
<td>700,000</td>
<td>719,000</td>
<td>729,800</td>
<td>738,400</td>
</tr>
</tbody>
</table>

aGDP growth estimates come from the Australian Department of Foreign Affairs and Trade at http://www.dfat.gov.au/geo/fs/russ.pdf
bRubles are expressed in terms of March 1996 values.
REFERENCES


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