Russia's cereal markets: current trends, changes in net-trade position, and policy implications

Russlands Getreidemärkte: Gegenwärtige Entwicklungen, Änderung der Nettohandelsposition und Auswirkungen auf die Marktpolitik

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Abstract

This paper provides an overview of the most recent developments on Russian cereal markets. A review of annual statistics on domestic production, trade, consumption, and storage of cereals reveals that the improvement in Russia's net trade position cannot only be explained by increased productivity of grain producers. Exhausted storage capacities and lowered real trade costs after the devaluation of the Russian rouble in 1998 seem to have contributed to these developments. A computable general equilibrium model for Russia based on 1999 data was used for analyzing various economic developments and policy changes. The model simulations show that market protection in the short run, when the flexibility of labor and capital is restricted, may benefit Russian farmers. If, however, in the long run such structural rigidities can be abolished, a more liberal trade regime would also be positive for the domestic farm sector.

Key words

Russia; agriculture; cereals; trade; General Equilibrium Analysis

Zusammenfassung

Diese Studie gibt einen Überblick über die neueren Entwicklungen auf den Getreidemärkten Russlands. Eine nähere Betrachtung verschiedener Indikatoren für inländische Produktion, Handel, Verbrauch und Lagerhaltung zeigt, dass die Veränderung der Nettohandelsposition Russlands nicht nur durch gesteigerte Produktivität der Getreideproduzenten erklärt werden kann. Ausgelastete Lagerkapazitäten und verringerte reale Handelskosten nach der Abwertung des Rubels im Jahr 1998 scheinen eine wesentliche Rolle gespielt zu haben. Die Analyse verschiedener wirtschaftlicher Entwicklungen und Auswirkungen von marktpolitischen Maßnahmen erfolgte mit einem Allgemeinen Gleichgewichtsmodell mit 1999 als Basisjahr. Die durchgeführten Simulationen zeigen, dass russische Landwirte kurzfristig von Maßnahmen zur Marktprotektion profitieren, wenn angenommen wird, dass Arbeit und Kapital im Betrachtungszeitraum im Agrarsektor gebunden sind. In einem längerfristigen Betrachtungszeitraum, in dem solche Rigiditäten nicht gelten, wäre eine liberale Handelspolitik auch für den russischen Agrarsektor vorteilhafter.

Schlüsselwörter

Russland; Landwirtschaft; Getreide; Handel; Allgemeine Gleichgewichtsanalyse

1. Introduction

In the past few years, grain production in the Russian Federation has increased continuously due to a number of factors: the significant real depreciation of the Rouble in the aftermath of the 1998 financial crisis opened "windows of opportunities" for domestic agriculture and the food industries because it improved the relative prices between imported and domestic products in favor of the latter. This increased price competitiveness of domestic consumer goods relative to imports has yielded significantly higher rates of return on investments in the domestic sectors. In response, capital that used to be exported abroad before the crisis has increasingly been invested in domestic food industries and with a time lag of one year also in domestic agriculture. Additionally, selected improvements in the institutional environment, such as in leasing opportunities of land, facilitated the emergence of new, vertically integrated agro-holdings and a reduction in the number of loss-making former collective farms. Hence, the financial crisis initiated economic changes which together with positive institutional changes provided the incentives to entrepreneurs to invest into efficiency enhancing technology and farm management systems. Furthermore, favorable climatic conditions over the three years 1999-2002 have contributed to a steady increase of grain production in Russia.

However, the recent increase in real incomes and the concomitant increase in demand for livestock products have not translated into a significantly higher demand for domestic livestock or cereal products yet. Instead a notable increase in meat imports has been observed, while domestic livestock production has not increased as much as Russian policy makers had hoped. Due to these reasons, Russia accumulated a substantial surplus in domestic grain markets and became a net exporter unexpectedly fast (some authors expected it much earlier). In fact, early estimates of grain exports in 2002 revealed exports of over 9 (almost 10) million metric tons (mt). Export facilities and capacities are seriously constrained, however, and traders have difficulties in getting shipping quotas in the export harbors and hence in getting their commodities abroad. Therefore, in 2002, domestic cereal prices plummeted, by between 30 – 40% as compared to 2001 (DÜRR, 2002). Compared to the previous two years the relative profitability of cereal production has thus fallen significantly. Generally this trend has been more pronounced for cereals of lower quality, e.g. feed grain.

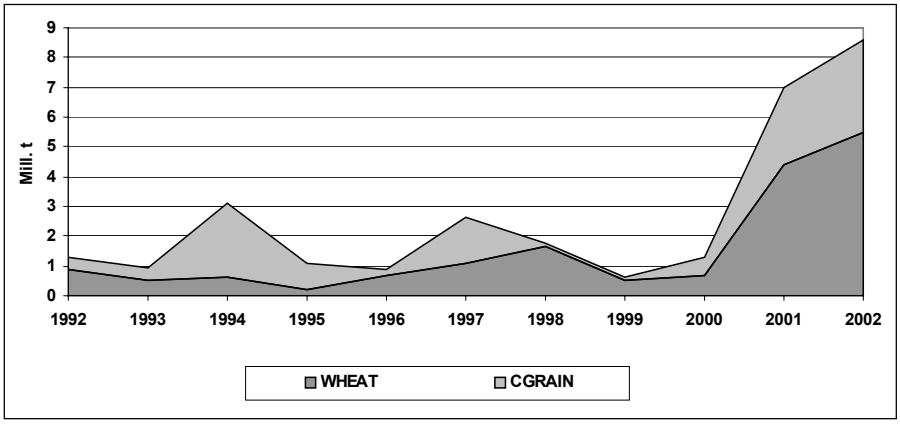
Because of these drastic changes cereal producers have increased their demands for market interventions by the Government of Russia (GOR) to cushion the downward trend of cereal prices. The GOR has responded to these demands and in fall 2002 implemented an intervention scheme for cereal markets. In April 2003 it also introduced import quotas for meat which effectively limit meat imports from abroad. Against this background, this paper will review and analyze the various policy options that are

currently being discussed with respect to cereal markets. In section 2 of the paper we will provide a more detailed overview of the most important trends in Russian cereal markets, the reasons for the change in its trade position, and policy options that are currently proposed and discussed. In chapter 3 peculiarities of Russia's farm sector that are relevant for policy analysis will be discussed. Chapter 4 analyzes important current cereal market policies on the basis of an economy-wide simulation model (a Computable General Equilibrium (CGE) model). This model highlights not only the sectoral effects of agricultural policies but also the effects of respective policies on the government budget, other sectors in the economy, and trade-related indicators. Chapter 5 summarizes the policy conclusions.

2. Structures and trends in Russia's cereal markets

In 2001 and 2002 grain production in the Russian Federation increased so substantially that Russia became a net exporter of cereals for the first time since 1913. The total output of cereals increased by 30% between the years 2000 and 2002. This phenomenon is partly explained by increased productivity of the agricultural sector itself and partly by favourable climatic conditions during these years. Despite the climate effect, several analysts expect a persistent change in the Russian net trade position in grain markets (e.g. LIEFERT and OSBORNE, 2002). The change in the country's net trade position that begun in 2001 has shown significant effects on Russia's cereal markets in 2002 already: domestic prices fell, which in turn led to lower incomes of those agricultural producers who had to sell their harvest at prices much lower than those anticipated at the time of seeding. Even though domestic feed demand increased slightly and stocks were filled up, neither of these actions could absorb all of the increase in supply. Consequently grain was exported and neither the high transportation costs nor the limited export-capacities of Russian seaports could prevent traders from supplying substantial quantities to world grain markets. The result was a rise in grain exports over 2000 to 2002 by about 600% (ERS PS&D, 2002) in which the change from 2000 to 2001 was the most significant (see figure 1).

Figure 1. Grain exports of the Russian Federation, in million metric tons, 1992-2002



CGRAIN: Quantity of coarse grains (barley, rye, maize, oats, buckwheat and other coarse grains)
WHEAT: Quantity of bread and feed quality wheat
Source: ERS (2002), own illustration

These dynamics have resulted in calls for a more active role of the government in Russia's cereal markets. On the one hand, there is a demand for income support measures for cereal producers. Respective options discussed include direct policy measures such as government purchases of grains and government stockpiling and indirect policies like tariff rate quotas on meat imports and subsidies for the improvement of the transportation infrastructure. On the other hand, there are the ongoing negotiations with the WTO over Russia's accession: because some of the prospective trade partners have relatively highly protected agricultural markets, Russian negotiators claim bound levels of import tariffs, domestic support to agriculture, and export subsidies upon accession to the WTO which are much higher than today's levels (WEHRHEIM, 2003b).[1] However, this contradicts the WTO's attempt to reduce agricultural protection world-wide and is therefore opposed particularly by the free-trade advocates in the WTO, such as New Zealand and Australia.

An important stimulus for the most recent trends in Russian cereal markets came from the significant devaluation of the Russian Rouble in the course of the financial crisis in mid-1998. Prior to the crisis the share of food in total Russian imports averaged between 25 and 30% and Russia's food trade deficit increased to almost $US 12 billion in 1997. Because of the financial crisis the nominal exchange rate of the Rouble to US$ fell from about 6 Rouble/US$ in July 1998 to 28 Rouble/US$ in August 1998 and stabilized around 23 Rouble/US$ in early 1999 (RECEP, 1999). While inflation caused a somewhat smoother development of the real exchange rate in the course of this crisis the respective real devaluation was with about 40% still significant. This real devaluation increased the prices of imported commodities within a period of a few weeks while the prices for domestic products increased at a lower rate according to the inflation rate. Domestic products became cheaper in relative terms while imports became more expensive. Particularly meat imports plummeted in the aftermath of the crisis. Agro-food imports in 1999 were 40% below the pre-crisis 1997 level (OECD, 2000: 142).

[1] In fact, Russia demands the right to grant export subsidies to cereal produces even though such subsidies have not been granted directly in the 1990s. The Russian negotiators argue, however, that subsidized rail freight rates in the early 1990s effectively constituted export subsidies. WTO negotiations will not be covered directly in this paper because the issue has been discussed in other studies (KISILEV and ROMASHKIN, 2002; WEHRHEIM, 2003b).

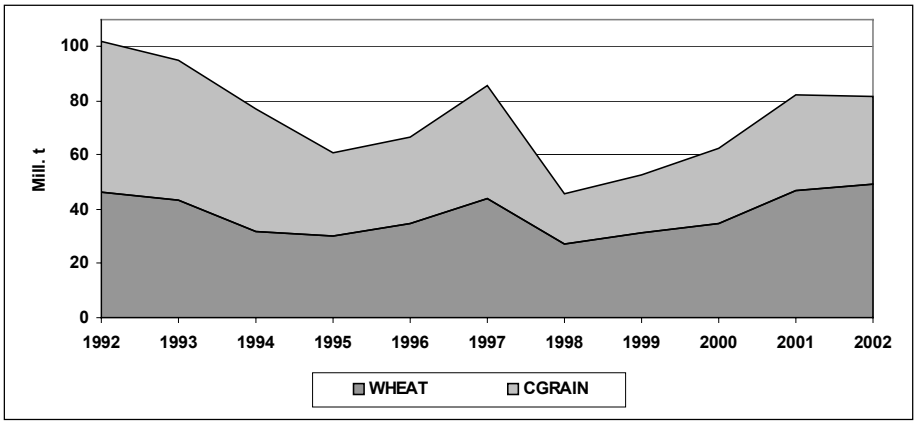
Hence, and as predicted by various authors (e.g. SEROVA et al., 1999) this opened a "window of opportunities": together with improvements in the institutional environment and investment climate, the financial crisis enhanced the incentive structure and the perspective to realize profits from investing in Russia's domestic sectors in general and in agriculture and the food industries in particular.[2] This is so because investments in sectors producing consumer goods that are adequate substitutes for imported goods became particularly more favorable. For instance, in the aftermath of the financial crisis non-agricultural investment conglomerates started to invest money in extremely large agroholdings. They are characterized by a high degree of vertical integration, normally operate under more modern and western management, make use of private capital, and are very commercial. A survey of 16 of these "new agricultural operators" conducted in 2001 in seven Russian regions in the southern and, hence, most fertile area of the country revealed an average size of these holdings of 36,000 ha (RYLKO, 2001). Similarly investments in domestic food industries rose and output in this sector of the economy grew in 1999 by 7.5% (OECD, 2000: 141).

In response to these developments the total output of wheat grew from 2000 to 2002 by 42% and of coarse grains by 17%.[3] Together with favourable weather conditions the major components for this increase were on the one hand, an extension of the harvested area from 43 to 46 million ha, and on the other hand increased average yields per hectare of 21%. Figure 2 shows the total outputs of grains in the Russian Federation for the last decade.

The data indicates that Russian cereal production in 1997 had already reached a production level as high as that of 2001 and 2002. In 1997 the country was on a gradual growth path which resulted in a significant output increase compared with 1996. However, grain production fell in 1998 to the exceptionally low level of 47.9 million mt (OECD, 2000: 140). In contrast to what happened in 2001-2002 the significant output increase in 1997 did not result in a comparable increase of exports to 2001-2002. The explanation for this observation can be found on the demand side, for which some stylized facts are presented in figure 3. The graph indicates that while food demand for wheat and coarse grain remained relatively stable, feed demand followed a more volatile pattern, especially in 1997, when it absorbed significant parts of the additional grain output. The remaining surplus of 12 million mt was stored, an important difference to 2001, when the surplus was partly stored and partly exported.

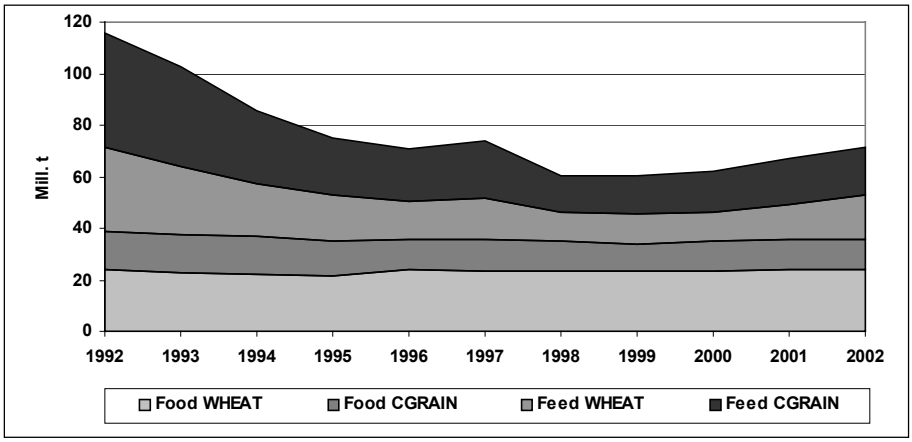
In fact, the change in cereal stocks in 2002 increased the pressure on domestic markets because the marginal increase in stocks was not sufficient to buffer the significant increase in production. In an open economy one would expect that domestic producers in such a situation would increase exports as long as the margin between domestic and world

Figure 2. Total grain production in the Russian Federation in million t, 1992-2002



Source: ERS (2002), own illustration

Figure 3. Total grain consumption in the Russian Federation in million t, 1992-2002



Feed: Usage for animal consumption
Food: Usage for human consumption

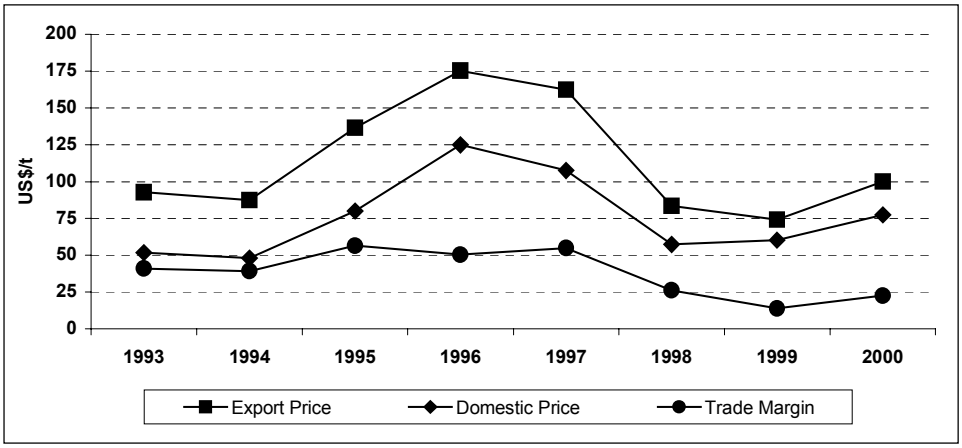
Source: ERS (2002), own illustration

[2] In fact this causality is consistent with an analysis by ALGIERI (2004) for the Russian Federation. ALGIERI showed empirically the following effects of the Dutch Disease in Russia: a real exchange rate appreciation, a decline of output in the non-booming sector, and a reduction in the non-booming sector exports. Assuming that agriculture and food industries are such non-booming sectors, the Dutch Disease symptoms depicted are just the mirror-image of the effects of the real devaluation following the financial crisis in 1998.

[3] In the following chapters, the term "wheat" includes food and feed wheat varieties, the term "coarse grains" covers barley, rye, maize, oats, millet, buckwheat and other coarse grains.

market prices is sufficiently high to cover transportation costs. Figure 4 shows the average annual domestic and export prices for wheat. The difference between them is regarded as the trade margin, including transportation costs, export taxes and transaction costs. Another difference between the situation in 1997-1998 and 2001-2002 is that while the cereal stored domestically was taken out of stocks in 1998, this was impossible in 2002 as grain production that year was again very high. Hence, the surplus situation persisted and stocks increased even further (figure 5).

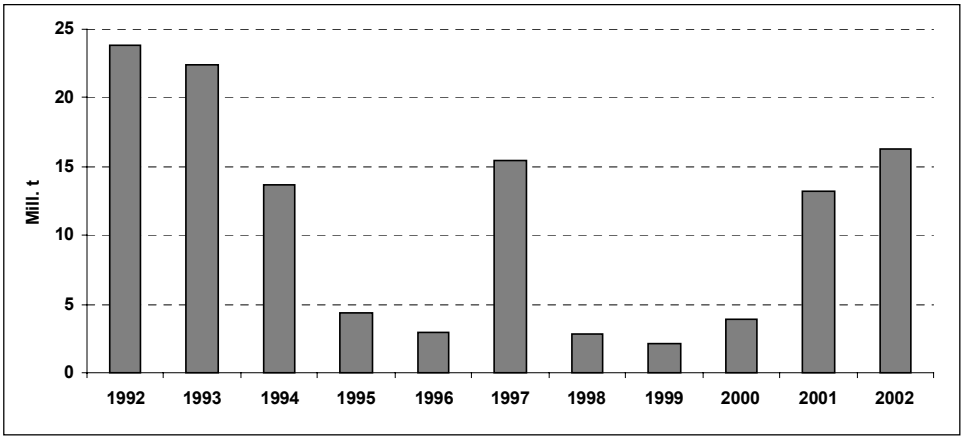
Figure 4. Average wheat prices in US$ in the Russian Federation, 1993-2000



Export Price: FAOSTAT (Exported value divided by exported quantity)
Domestic Price: GOSKOMSTAT (2001) (Calculated with annual exchange rate)
Trade Margin: Difference between export and domestic price

Source: GOSKOMSTAT (2001) and FAOSTAT, own illustration

Figure 5. Total cereals stocks in the Russian Federation in million t, 1992-2002



Source: ERS (2002), own illustration

Export prices and domestic prices show similar dynamic behaviour, which indicates an absence of strong governmental influence and a relatively liberal trade regime. Unfortunately, average annual prices for the last two years were not yet available. Nevertheless, there is a remarkable change in trade margins after the crisis, which is likely to persist into 2001: in 1997, trade costs amounted to 55 US$ per ton and in 2000 only 23 US$, facilitating the transformation of domestic cereal production into exported quantities. The different cost-components of cereal trade are difficult to quantify, but there is some evidence, that transportation costs represent the major part among them (KUHN, 2001). While this absolute reduction in trade margins in 1999 was mainly due to the exchange rate effect, the trade margin narrowed further in 2000. In 2001, the data again indicates a moderate increase of the trade margin in absolute terms, but in relative terms the margin was much lower than in the years prior to the financial crisis (i.e. 1996 and 1997). This may be indicative of the fact that the institutional environment in Russia in general but also with respect to the agricultural sector has in fact improved, resulting in a reduction of transaction costs. For instance, the reliability of contracts has improved in the aftermath of the financial crisis. On the one hand this increases the incentives to lease agricultural land. On the other, improved contract security seems to offer grain producers better opportunities to ship their cereals to far away locations where higher prices may be realized.

From the considerations above it can be concluded, that the change in trade position of the Russian Federation on cereal markets can only be explained by a mix of factors: favorable weather conditions, the relatively more favorable exchange rate as if compared to pre-crisis levels, increased productivity of grain production, exhausted storage capacities, and changes in real trade costs after the devaluation of the Russian Rouble in 1998 all seem to have played an important role.

3. Characteristics of the Russian agricultural sector

The agricultural sector of the Russian Federation is still significantly influenced by various legacies of the Former Soviet Union (FSU), where basically two kinds of agricultural producers existed: the large scale collective and state farms, i.e. the *Kolkhozes* and *Sovchozes*, and the household plots with land areas less than one hectare. Both structures persist to this day, although the collective and state farms have been restructured into new legal entities and were partially devolved into private farms. Private farming became an option after the break up of the FSU in 1992, but due to the poor institutional and investment climate in the rural economy never became important. The restructuring of the former collective farms rarely went along with either the introduction of more efficient management structures or the adoption of

modern western technology. This passive instead of active restructuring has been one factor that explains why Russia's agricultural output did not grow earlier on in the 1990s. The three types of agricultural producers differ significantly with respect to their share of the total commodity output of Russia's agricultural sector and with respect to the commodities they produce (table 1).

According to the availability of arable land and technology, large-scale farms contribute the largest production share for cereals, sugar beet and sunflower. Household plots produce the highest share of potatoes, vegetables, and horticultural products. Meat and milk are produced in almost equal shares; according to official statistics egg production is mainly conducted by large-scale farms. Private farms show no outstanding contribution to any of the considered commodities; only in cereals and sunflower seed do they have shares of above 5%. The question, which farming structure will be affected by the changes in trade has not yet been addressed. Table 2 shows the shares of the different commodities in the income composition of the three types of farms.

Income of private farms in 2000 depended on cereal production by almost 50%, in the case of large-scale farms by 37%. Household plots get the most significant part of their incomes by growing potatoes and vegetables (43%). Altogether, the data indicates that the large-scale farms are mainly responsible for the observed increase in cereal production but private farms might suffer from the drop in prices to a higher extend. Household plots are not affected by falling grain prices as only 0.3% of their total produced value is generated from this crop. However, as they engage in significant small-scale livestock production, the decline in feed prices might indirectly be beneficial to them.

Table 1. Contributions of different farming structures to total output quantities, 2000

	Large-scale farming	Household plots	Private farms
Cereals	90,7%	0,9%	8,4%
Sugarbeet	94,4%	0,7%	4,9%
Sunflowerseed	84,4%	1,4%	14,2%
Potatoes	6,5%	92,4%	1,1%
Vegetables	19,9%	77,9%	2,2%
Meat	40,3%	57,9%	1,8%
Milk	47,3%	50,9%	1,8%
Eggs	70,9%	28,7%	0,4%
Other products	23,6%	72,7%	3,8%

Cereals: All kinds of cereals
Meat: Beef, pork and poultry in slaughter weight.
Other products: All kinds of products not covered by the categories above, particularly honey and wool.

Source: GOSKOMSTAT (2001)

Table 2. Income composition of the different farm types, 2000

	Large-scale farming	Household plots	Private farms
Cereals	37,4%	0,3%	49,3%
Sugarbeet	2,0%	0,0%	1,5%
Sunflowerseed	2,8%	0,0%	6,8%
Potatoes	2,4%	27,6%	5,9%
Vegetables	5,0%	15,6%	7,9%
Meat	15,4%	17,7%	9,8%
Milk	16,5%	14,2%	2,0%
Eggs	7,0%	2,3%	7,6%
Other products	11,3%	22,4%	9,3%

Source: GOSKOMSTAT (2001), own calculation

4. Russian grain market policies: an analysis of economy-wide effects

The described changes in Russia's grain production and the respective consequences are currently subject to intense public debate. Various policies have been proposed including direct income support for farmers, governmental grain purchases and indirect measures such as tariff rate quotas (TRQ) on meat imports to promote domestic animal production thereby increasing domestic demand for feed grains.

In fact, because of the price collapse for grains, an intervention system that seems to be reminiscent of that of the EU was implemented in late 2002. One million mt of cereals were purchased in November 2002 at a cost of 2 billion Roubles. Assuming an exchange rate of almost 30 Roubles/US$, the respective average intervention price equaled about US$ 67 per t.[4] Total government funds for this kind of intervention amounted to 6 billion Roubles, which would correspond to purchases of about 3 million mt or 4% of the total cereal production in this year assuming the same price as in November 2002.

The implementation of TRQs has to be seen against the historical background: livestock production was heavily subsidized in the Former Soviet Union and consumption levels of meat were high in absolute terms (e.g. OECD 1998) and far above those of other countries of comparable income levels (WEHRHEIM and WIESMANN, 2003). While average per capita consumption of meat and meat products fell between 1990 and 1997 by 32% (from 75 kg per capita in 1990 to 51 kg in 1997), total meat production plummeted in the same period by 52% (OECD, 1998: 50 and 57). To balance the difference, Russia became a major importer of meat from abroad. Over 1996-2002 average total meat imports were 2.6 million tones (LIEFERT et al., 2003: 18). Particularly the EU and the US exported subsidized meat in significant quantities to Russia. Against this background Russia intends to support its livestock industry and intends to reduce the quantities of imports originating from subsidized exporters like the EU and the US but also from others like Brazil. In the context of the WTO accession negotia-

[4] The intervention price is probably lower as the purchased quantity refers to 11/13/2002 and the purchased value to 11/20/2002, when a higher quantity will have been purchased. Besides, it is difficult to compute an average intervention price for 'grain' since there are also significant heterogeneities in quality.

tions the Russian Ministry of Agriculture is requesting a TRQ of 0.5 to 0.8 million mt for poultry (LIEFERT and OSBORNE, 2002) or 44% to 70% of the imported quantity in 2000. In April 2003 the Russian Ministry for Agriculture introduced TRQ which were prolonged for 2004. 90% of these quotas were allocated to importers according to historical imports between 2000 and 2003.[5] Another 10% are planned to be sold in an auction in early 2004 (DBM, 2004). It should be noted that already prior to these quotas becoming effective the dairy and meat industry had become the most dynamic ones in Russia's agro-food sector: in 2002 (in 2003) the output of the dairy and meat sector grew by 10.5% (7%) (DBM, 2004). Given the significant backward linkages between meat and cereal production (i.e. high demand for feed cereals as a major input for domestic livestock production) any significant changes in the livestock sector will have substantial effects on Russia's cereal markets as well.

With the aim of investigating the effects of the above mentioned policy developments on cereal markets, an economy-wide, so-called computable general equilibrium model (CGE model), that was developed and used earlier by WEHRHEIM (2003) and WEHRHEIM and WOBST, (forthcoming), was adapted and updated for the analyses in this study. The major characteristics and structure of the model and its database will be described in the following section and in box 1. This modeling approach has been chosen because of the relatively high contribution of agriculture to Gross Domestic Product (GDP), the high expenditure share of households on food, and the relatively high share of agro-food items in total imports. Agricultural sector policies are likely to have significant economy-wide repercussions (see table 3) and the important role of the agricultural sector as provider of employment should be taken into account while analyzing this particular sector. Given the kind of policies discussed, they are also expected to have notable fiscal implications. Furthermore, the model can help to identify partial sectoral repercussions such as the linkages between meat and grain markets or the effects of different policy approaches on the three different farm types.

4.1 Model characteristics and structure

The model used here belongs to a family of CGE models, which was developed by the Division for Macroeconomics and Trade at the International Food Policy Research Institute (IFPRI) in Washington, D.C. A non-technical summary of the model's feature is given in box 1.

The major characteristics of the Russia model are the following:

- **Comparative – static:** different policy options or expected developments can be simulated and compared with the benchmark solution of the base year (i.e. 1999). Hence, dynamic developments of any variable in the Russian economy are not taken into account.
- **General equilibrium:** the model represents the entire income flow of the Russian economy in the base year at a highly aggregated level. Production sectors, consumers and the government are represented separately and interlinked by commodity-markets and by factor-markets for labor and capital. The system is completed by macroeconomic equilibrium conditions, for instance the savings-investment identity, which "close" the system. Domestic prices and factor costs, such as wages, are calculated endogenously.
- **Theoretical and empirical consistency:** the system of behavioral and general equilibrium equations complies with Walras' law which assures theoretical consistency. All income flows in the economy are based on the double-book-keeping approach of national accounting which assures the empirical consistency of the model.
- **Deterministic:** random effects are not covered.
- **Partly synthetic:** although most parameters (such as share parameters) can be calibrated directly from the base year data (social accounting matrix, SAM, see next chapter), some have to be taken from the literature (for instance trade elasticities).

Similar to WEHRHEIM and WOBST (2003) Russia's agricultural sector is disaggregated first by institutional characteristics, i.e. the types of farms as described in chapter 3.

- large scale farms (LSF)
- household plots (LPH)
- private farms (PRIV)

These farm types produce the following commodities:

- cereals (CERE)
- sugar beet (SGBT)
- sunflower seed (SUNF)
- potato (POTA)
- vegetables (VEGE)
- beef (RMEA)
- pork (PORK)
- poultry (POUL)
- raw milk (MILK)
- fresh eggs (EGGS)
- all other agricultural products (OAGR)

The distinction between agricultural production activities and farms is an important innovation in such an economy-wide model because it allows not only the identification of the effects of exogenous general and commodity-specific policy changes on agricultural commodity markets, but additionally the aggregate effects on different types of farms.

4.2 Database

In order to represent the complete set of economic activities of a country in a given year, general equilibrium models rely mainly on the national accounting system, including the production accounts, the balance of payments, the current account of the government etc. A convenient way of arranging this multi-facetted data base is a Social Accounting Matrix (SAM). In this matrix the accounts of all "social institutions" (e.g. producers, markets, the government, households, and the rest of the world) are combined in one symmetric table. The requirement of a balanced system is fulfilled when the expenditures and revenues of each social account are balanced. Therefore, the

[5] The annual import quotas for beef and pork will be 420 000 and 450 000 mt, respectively. The enlarged EU (the US) will be granted quotas of 331 800 (17 200) mt beef and 227 300 (42 200) mt of pork. The import quota for poultry amounts to 1 050 million mt of which 771 900 mt was allocated to the US and 205 000 to the enlarged EU.

Box 1. Important features of the model

Standard CGE model along the lines of models as described in LÖFGREN et al. (2002).

Major actors in the economy: producers, one representative household, the central government, a savings/investments account, and the rest of the world.

Behavioral design of the production side: producers minimize their costs under the conditions of a neoclassical production function. Intermediates are used according to sectorally specified and fixed input output coefficients. Substitution between labor and capital is specified with a constant elasticity of substitution (CES) function. Value-added prices are determined as the difference between sectoral unit revenues and unit costs for intermediates. Producers maximize their revenues from domestic sales and exports under the restriction of a constant elasticity of transformation (CET) function.

Behavioral design of the demand side: consumers maximize their utility under the restriction of a budget constraint. Final demand of households for consumption goods is determined through a linear expenditure system (LES) using fixed minimum expenditure quantities and fixed marginal expenditure shares. Subsistence demand is an important component of total household consumption. The LES demand system combines composite goods with subsistence goods. While the composite goods are *sold* via the commodity markets (valued at consumer prices), the subsistence goods originate directly from the agriculture and food-processing activities, because of which no marketing margins have to be paid (valued at producer prices). The marketed commodities are composite goods comprising of domestic and imported goods using a constant elasticity of substitution (CES) function. This represents the *Armington assumption*, which implies that home and foreign goods are imperfect substitutes.

Domestic prices for imported commodities are determined by respective world market prices, the exchange rate and tariffs. The model assumes perfectly elastic import supply (small country assumption). Consumer prices are the weighted average of domestic product and import prices.

Government receives revenues from import tariffs, export taxes, and indirect production taxes, as well as direct income taxes. Government demand is determined using fixed shares of aggregate real spending, while the budget surplus is defined as the difference between revenues and government demand for goods.

World market prices are exogenous, domestic import and export prices depend on world market prices, tariff and export tax rates, as well as the exchange rate.

Determination of equilibrium: changes in relative prices and substitution possibilities determine supply, demand and trade. If relative prices change, substitution can take place between factors of production, export supply and domestic supply, imports and domestically produced imperfect substitutes, and different commodities in demand. Export demand is price elastic, which is particularly important for Russia's energy sector. Domestic export prices depend on their respective *f.o.b.* prices in foreign currency (US$), the export subsidy and the exchange rate. All prices in the model are determined as relative prices and no monetary market is explicitly modeled. Out of *n* prices in each sector (e.g., import price, producer price, etc.) *n-1* prices are linear dependent from other prices. Hence prices have to be defined in relation to some exogenously determined price. Here, the domestic sales price index is kept constant and used as the *numeraire*.

Macro-closures: we have chosen a standard specification in order to keep the causality in the model economy straightforward. The balance of trade is equilibrated through a flexible exchange rate, as the Russian rouble has significantly adjusted to changes in the international competitiveness of the Russian economy in the second half of the 1990s (c.f. POGANIETZ, 2000). With respect to final demand we have chosen the so-called "balanced closure" (LÖFGREN et al., 2002): the shares of private and government consumption and investment demand in total absorption have been kept constant.

Modeling transition-specific features in the model

Reduced mobility of resources: our short run experiments reflect some of the features characteristic for the Russian economy in transition by reducing the full mobility of economic resources. The result is a combination of standard neo-classical behavior with economic features of imperfect markets or structural rigidities. Therefore, our model could be best classified by "neo-classical structuralism" (ROBINSON, 1989).

Representing subsistence demand: for each sector we differentiate between the production in producer prices and sales in consumer prices. This allows making a distinction between subsistence demand from sectors (at producer prices) and demand from markets (in consumer prices).

Disaggregation of the primary agricultural sector: we distinguish three agricultural sub-sectors by type of producers (former collective farms, household producers, and private family farms).

Transaction costs: we explicitly included sector-specific transaction costs in the model which affect the efficiency of specific sectors. For instance, subsistence farming sells little to the market because transaction costs to reach the market in our model are relatively higher than those for commercial agricultural producers.

Source: based on model description in WEHRHEIM and WOBST (forthcoming)

sum of table-rows (representing the revenues of each social account) has to equal the sum of the respective table-columns (representing the expenditures of each social account). In order to be able to analyse the latest developments in Russia's grain markets, a major task has been to update the SAM developed and described by WEHRHEIM (2003a) for 1994 to a more recent year. The most recent, comprehensive and available dataset referred to the year 1999 (GOSKOMSTAT, 2002), providing information about trade and domestic production values. The demand for intermediate inputs is represented in an input-output table (IOT), which was available for the same year.[6]

[6] The reliability of official data from the Russian Federation has improved significantly in the course of transition. Nevertheless, caveats remain such as inaccuracies in the measurement of agricultural production by types of producers or the exact amount of agricultural trade. However, in the context of this study we had to rely on official data as no other consistent data set for economy-wide analyses is available.

Table 3 shows the results, the composition of GDP and the total production value of all major sectors represented in the model, as well as their respective shares in the total national payments made that year for labour and capital. The highest share in GDP is generated by the service sector, followed by agriculture, which still generates 9% of GDP. Furthermore, the data reveals one important result of the transition process in as far as after a decade of restructuring, the household plots are the most important farming structure within Russia's agricultural sector, generating 5.9% of the national income and paying 10.4% of the national expenditures for labor.[7] Comparing the labour intensity of large-scale and household farming it becomes evident, that the former is more capital intensive while the latter is more labour intensive, which is a plausible representation of one of the most distinct differences of the production structure of both farm types.

Table 3. Structure of the Russian economy by activities for 1999, in %

		GDPFC	PROD	LABSHR	CAPSHR
Industries	Electric power	3,4	3,4	3,2	3,6
	Fuel	7,5	8,5	3,7	10,2
	Metall	7,0	8,2	4,2	8,9
	Chemicals	2,2	2,8	1,9	2,4
	Machinery	5,4	1,7	5,6	0,4
	Wood	1,8	1,9	1,8	1,8
	Light manufacturing	0,6	0,9	0,8	0,4
	Construction	8,2	7,6	9,3	7,5
	Other Industries	0,9	6,7	2,7	4,6
Food Industries	Sugar refineries	0,3	0,5	0,3	0,4
	Flourmilling	1,1	1,9	0,9	1,2
	Meatprocessing	1,0	1,7	0,8	1,1
	Dairyproduction	0,6	1,3	0,5	0,7
	Other food production	1,2	1,9	1,0	1,4
	Animal feed production	0,2	0,2	0,1	0,2
Agriculture	Large scale farming	2,9	3,2	1,9	3,6
	Household plots	5,9	4,5	10,4	2,8
	Private farming	0,2	0,2	0,2	0,2
Services	Trade and Transport	28,5	23,6	12,1	40,0
	Other Services	21,1	19,2	38,8	8,8
Totals	Total Agriculture	9,0	7,9	12,5	6,6
	Total Non-Agriculture	91,0	92,1	87,5	93,4
	Total	100	100	100	100

GDPFC: GDP at factor cost
PROD: Total production value
LABSHR: Share in total payments for labour
CAPSHR: Share in total payments for capital

Source: own calculation based on WEHRHEIM (2003) and GOSKOMSTAT (2002)

Summing up, the structure of the economy represented by the data base in the model resembles important structural features of the Russian economy in general and the agricultural sector in particular as it is reported by official data sources.

4.3 Simulations

The base year for all simulations is 1999. All changes of variables in response to any of the exogenous policy simulations will be given in relation to this base year as percentage changes. In order to investigate the effects of the increased cereal production in the aftermath of Russia's financial crisis, the first simulation (exp. 1) will address the effects of a productivity increase of cereal production by 55% as happened between 1999 and 2002. The second and third scenario will deal with the implementation of TRQs on imports of raw (exp. 2) and processed meat (exp. 3), which will be compared with a fourth scenario (exp. 4) in which foreign trade related costs will be decreased. The latter could be the result of increased investments in foreign trade-related infrastructure (e.g. better harbor facilities etc.).[8] The fifth scenario (exp. 5) relates to a more theoretical debate in the ongoing negotiations for the Russian WTO accession. Here, further liberalization of Russia's agricultural trade system is discussed. However, because the level of agricultural trade protection in the base year was modest, we simulate an extreme form of further liberalization by abolishing all agricultural trade barriers represented in the model (exp. 5).[9] Direct grain market interventions will not be simulated since the proposed intervention volume is relatively low (4% of produced quantity, see above) and because the computational effort to implement such a scenario would be high.

The simulations are conducted under different assumptions concerning the mobility of labor and capital in order to

[7] One may argue that owners of household plots do not make any payments for labor as they pay no wages nor are any monetary transactions involved. However, it is quite evident that income in kind is generated from the household plots which can be mainly attributed for the labor input of the operators of the household plots. If one computes the value of the production of food, using prices from neighboring markets, one can also calculate a monetary estimate of the associated income flow. Because households are consumers and producers alike, one can thereby also approximate the share of the production costs that is due to the labor input of the household plot operators.

[8] It should be noted that the exogenous shock imposed by exp. 1 and 4 would be associated with private and/or public investments. Because the specific amount of such investments could be based on speculation only, we did not include this in the design of the experiments. Therefore, care should be taken when interpreting the results as they do not adequately reflect the change in the government budget.

[9] It should be noted that in the model only tariff barriers to trade are included. In the WTO negotiations non-tariff barriers to trade also receive a lot of attention. For instance, administrative regulations of regional governments or sanitary and phyto-sanitary measures imposed on food trade might in practice limit the amount of imports for specific agro-food commodities.

compare the effects of certain policy measures against the background of a fully flexible and a somehow rigid economy. In the first case, which resembles a short run scenario, labor and capital are bound to remain in agricultural or non-agricultural sectors, respectively, but they may move within those sector-aggregates (see table 4). In the second case which resembles a long run scenario labor and capital can move from one productive sector into another without any restriction (see table 5).[10] Unemployment is not incorporated. Even though this is a deviation from the real world, this specification can be justified by the observation, that labour markets in the Russian economy after the financial crisis hit the country in 1998 have proven to be more flexible than for instance in many countries of western Europe: according to official statistics (GOSKOMSTAT, 2002) the unemployment rate in Russia dropped between 1999 and 2002 (last quarter) from 12.5 to 7.0% and thereby is by 1.4 percentage points lower than the EU average (WIRTSCHAFTSWOCHE 6/2003). Table 4 and 5 summarize the results for the short term and long term version of the model, respectively.[11]

4.3.1 Increase of grain productivity (exp. 1)

As mentioned above, it is assumed that a combination of various factors such as favorable weather conditions, improved management practices, and the real depreciation of the Rouble have induced the marked production increase of grains in the years 2000-2002. These effects together are simulated here as an exogenous shock that consists of a productivity increase of 55% in the cereal sector only. Because our data-base refers to 1999 and official data on the trends in Russia's cereal sector for the consecutive years is already available from statistical sources we can challenge the results of our model simulations against real world developments. The significant increase of productivity which was exogenously imposed on our model economy is unlikely to have materialized within one year only. Under the assumption, that it reflects the cumulative effect of a medium-term period, e.g. three years, we compare the model results with observed cumulative changes on Russian grain markets between 1999 and 2002 which are available from USDA sources (ERS, 2002). Hence, in addition to the economic repercussions this experiment reveals, the results of this scenario show that both the direction and the degree of the model results are relatively realistic. The deviations between our model simulations and the respective real-world changes as reported by USDA are shown in table 6.

The similarity in the scope of economic changes is evident, for instance, if one compares the change in grain production: both USDA data sources as well as our model simulations show an increase of grain production in the Russian Federation of about 55%. Because human consumption combined with other domestic uses increased to a much lower extent, USDA data and our model results indicate a significant increase in exports. According to USDA data export quantities grew by 1 313% in this period. In both the mobile and the rigid specification of our model, the transformation of domestically produced quantities into exported quantities is lower but also amounts to almost 1 000%. The same applies for the import-side, for which the effects in our model are more moderate: while the USDA data reveals a decline of 82%, our model results are with about 40% more moderate. In spite of these deviations, it is important that the model results replicate the direction of changes correctly. Furthermore, it has to be noted that the real-world developments shown in the table are responses to a complex set of changes, which may have happened in the real world between 1999 and 2002 simultaneously. In contrast the comparative-static character of our model reveals only the effects of isolated exogenous developments. For instance, it is likely that not only the productivity of cereal production improved between 1999 and 2002 but also the trade infrastructure. Hence, the transformation of domestic production into traded quantities has been facilitated, and this has not been incorporated in this model simulation. It should also be stressed, that the model calculations are based on values, while the USDA calculations refer to quantities. This would be irrelevant only as long as prices remain the same within the observed period. Based on this discussion, it can be concluded, that while the simulation results adequately reflect real-world trends in Russian cereal markets, some differences with real world developments remain. They have to be taken into account when interpreting the model results.

Before moving on to the next simulation, it seems worthwhile to have a look at some other endogenous changes of the model simulation, i.e. the price effects which coincide with the change in Russia's trade position, which is also a result of the experiment. The simulations show a reduction of the domestic producer cereal price by around 47% in both model versions. According to the information on the structure of cereal production presented in chapter 3, this would harm the large-scale farms and to a higher degree than private farmers because the latter generate 49% and the former 38% of their total income by producing cereals. One remarkable result of the short term simulation of exp. 1 is the decrease in employment in the private farming sector by 13% (not reported in table 4). Because in this model specification we did not allow labor shifts between agricultural and non-agricultural sectors the drop of marginal productivity in the private farm sector is compensated by shifts of labor towards the household plots. This resembles another real world development, namely that the household plot sector can under certain circumstances function as a sink for the rural labor force which is released from large-scale agricultural enterprises.

Also the feedbacks on the GDP should be mentioned: the increased productivity in cereal production causes (ceteris

[10] The second case could be considered to resemble a more long-term perspective as it assumes that structural rigidities which reduce the mobility of both, labor and capital, are abolished. This could be accomplished in the long run through consecutive improvements in the institutional environment which relax, for instance, the restrictions of people from rural areas to settle in urban centres such as Moscow and St. Petersburg. In fact, at the moment requirements such as this one continue to prevent a more significant influx of labor into these two major cities of the Russian Federation.

[11] In tables 4 and 5 we report results of the simulations only for a selection of variables. Additionally, in the text we report results for a few additional variables in cases when such information seems relevant.

Table 4. Simulation results based on short term specification of economy-wide model for the Russian Federation

Variables	Base period values	Exp. 1: Increase in Cereal Output	+Exp. 2: Introduc-tion TRQ on Meat Imports	+Exp. 3: TRQs on Processed Meat Imports	+EXP. 4: Decrease of Trade Costs by 50%	+Exp. 5: Free Trade
	Bill. US$	change to base period in %				
Macroeconomic results:						
GDP at market prices	154,7	0,7	0,7	0,6	0,7	0,7
Household income	96,2	1,3	1,4	1,7	1,4	-0,2
Household consumption, of which	73,4	1,0	0,9	0,3	0,9	2,1
Market demand	67,7	1,0	1,0	0,3	1,0	2,2
Subsistence demand	5,6	0,0	0,0	-0,1	0,0	0,2
Government budget	-4,4	1,4	1,3	-5,5	1,8	74,0
Exports	75,2	-0,2	-0,2	-0,7	-0,2	2,2
Imports	44,3	-0,4	-0,4	-1,2	-0,4	3,7
Exchange rate	1,0	0,6	0,6	0,2	0,5	0,6
Consumer Price Index	1,1	0,4	0,4	1,4	0,3	-2,1
Sector-specific results:						
Export prices						
Cereals	1,0	0,6	0,6	0,2	4,9	0,5
Beef	1,0	0,0	0,0	0,0	0,0	0,0
Pork	1,0	0,0	0,0	0,0	0,0	0,0
Poultry	1,0	0,0	0,0	0,0	0,0	0,0
Export						
Cereals	0,1	991,7	991,4	987,2	1030,1	1016,6
Beef	0,0	0,0	0,0	0,0	0,0	0,0
Pork	0,0	0,0	0,0	0,0	0,0	0,0
Poultry	0,0	0,0	0,0	0,0	0,0	0,0
Import prices						
Cereals	1,0	0,6	0,6	0,2	0,5	-4,0
Beef	1,1	0,6	38,9	0,2	0,5	-12,1
Pork	1,1	0,6	44,4	0,2	0,5	-14,0
Poultry	1,1	0,6	0,6	0,2	0,5	0,6
Imports						
Cereals	0,8	-42,6	-42,6	-42,7	-41,3	-40,9
Beef	0,0	4,0	-26,0	19,5	4,2	11,5
Pork	0,0	4,5	-29,3	20,7	4,5	14,6
Poultry	0,0	4,1	3,7	11,3	4,2	0,0
Value added price						
Large scale farms	1,0	7,2	7,4	10,8	8,1	1,3
Household plots	1,0	7,5	7,7	11,2	8,2	1,6
Private farms	1,0	7,3	7,6	11,0	8,1	1,4
Domestic production						
Cereals	2,8	55,4	55,4	54,9	56,3	55,2
Beef	1,4	0,2	0,2	0,3	0,2	0,1
Pork	1,6	0,2	0,2	0,2	0,1	0,1
Poultry	1,0	0,2	0,2	0,3	0,2	0,1
Household demand, market						
Cereals	0,9	0,0	-0,5	-3,5	-0,1	2,4
Beef	1,0	-0,1	-0,4	-3,7	-0,2	2,3
Pork	0,8	0,0	0,0	-1,9	-0,1	1,4
Poultry	0,8	0,0	0,0	0,1	-0,1	1,7

Note: Results for exp. 1 are percentage change in comparison to base year (=1999). Results for all consecutive experiments are the cumulative effects of experiment 1 plus the respective exogenous shock simulated with the respective experiment.

Source: own simulation results based on economy-wide model for the Russian Federation.

paribus) a small but remarkable growth of 0.7% in both model specifications.[12] This is a contradiction to the above mentioned suffering of the agricultural sector from low cereal prices, but the economy as a whole takes advantages from this development because of the lowered input costs for cereal-demanding sectors such as flour-milling and animal breeding.

The next simulations are conducted under the assumption, that the Russian government will attempt to limit the negative price effects that coincided with the change of the country's net trade position in cereal markets. Therefore, the results of all additional simulations will not refer directly to the base year 1999. Instead we will report the cumulative changes of exp. 1 plus the individual policy experiment under discussion.

4.3.2 Implementation of TRQs on meat imports

Tariff rate quotas were implemented in the model in the following way. First, by introducing a prohibitively high tariff (three times the level of the base period) on meat imports, if the imports become higher than 62.5% of the real world imports in 2000 – a percentage somewhere between the 44 – 70% claimed by the Russian Ministry of Agriculture in the WTO negotiation process. As the base year of the model is 1999, the imported quantities, which would cause the implementation of TRQs were adjusted to the level of the year 2000, when the imports of beef and pork were much lower and hence, the TRQs would apply at a comparatively low level of quantity imported. Second, a tariff on processed meat of 70% (20% in 1999) is introduced if the simulated imports of this commodity exceed 80% of the base year values (1999). Because these policies

[12] After exposing our model to an exogenous shock it has to find a new equilibrium solution. Standard exogenous policy shocks should yield an equilibrium that is located on the economy-wide production possibility frontier. Only in the case of productivity increases we can expect some more significant increase of GDP.

Table 5. Simulation results based on long term specification of economy-wide model for the Russian Federation

Variables	Base period values	Exp. 1: Increase in Cereal Output	+Exp. 2: Introduc-tion TRQ on Meat imports	+Exp. 3: TRQs on Processed Meat Imports	+EXP. 4: Decrease of Trade Costs by 50%	+Exp. 5: Free Trade
	Bill. US$	change to base period in %				
Macroeconomic results:						
GDP at market prices	154,7	0,6	0,6	0,5	0,7	0,6
Household income	26,6	-1,0	-1,1	-1,8	-1,2	-10,6
Household consumption, of which	73,4	1,3	1,3	0,9	1,4	2,0
Market demand	67,7	1,4	1,4	1,0	1,5	2,1
Subsistence demand	5,6	0,2	0,2	0,2	0,2	0,2
Government budget	-4,4	-1,9	-2,1	-10,6	-1,8	74,4
Exports	75,2	-0,3	-0,3	-0,8	-0,3	2,2
Imports	44,3	-0,5	-0,5	-1,4	-0,5	3,7
Exchange rate	1,0	1,0	1,0	0,9	1,0	0,5
Consumer Price Index	1,1	0,0	0,0	0,8	0,0	-2,0
Sector-specific results:						
Export prices						
Cereals	1,0	1,0	1,0	0,9	5,4	0,5
Beef	1,0	0,0	0,0	0,0	0,0	0,0
Pork	1,0	0,0	0,0	0,0	0,0	0,0
Poultry	1,0	0,0	0,0	0,0	0,0	0,0
Export						
Cereals	0,1	974,1	975,2	991,8	1020,0	951,0
Beef	0,0	0,0	0,0	0,0	0,0	0,0
Pork	0,0	0,0	0,0	0,0	0,0	0,0
Poultry	0,0	0,0	0,0	0,0	0,0	0,0
Import prices						
Cereals	1,0	1,0	1,0	0,9	1,0	-4,1
Beef	1,1	1,0	39,5	0,9	1,0	-12,1
Pork	1,1	1,0	45,0	0,9	1,0	-14,1
Poultry	1,1	1,0	1,0	0,9	1,0	0,5
Imports						
Cereals	0,8	-41,8	-41,8	-41,8	-40,4	-40,3
Beef	0,0	0,4	-28,7	12,3	0,1	12,1
Pork	0,0	0,7	-32,0	13,0	0,3	15,4
Poultry	0,0	0,2	-0,2	4,6	-0,1	0,6
Value added price						
Large scale farms	1,0	1,1	1,1	1,0	1,1	2,3
Household plots	1,0	1,3	1,3	1,3	1,3	2,4
Private farms	1,0	1,2	1,2	1,1	1,2	2,3
Domestic production						
Cereals	2,8	55,4	55,5	56,6	56,8	51,6
Beef	1,4	1,5	1,6	2,4	1,7	-0,2
Pork	1,6	1,5	1,6	2,4	1,7	-0,2
Poultry	1,0	1,5	1,6	2,4	1,7	-0,2
Household demand, market						
Cereals	0,9	1,4	1,0	-1,3	1,5	2,1
Beef	1,0	1,3	1,1	-1,5	1,5	2,0
Pork	0,8	1,4	1,6	0,4	1,6	1,1
Poultry	0,8	1,8	1,9	3,2	2,0	1,3

Note: Results for exp. 1 are percentage change in comparison to base year (= 1999).
Results for all consecutive experiments are the cumulative effects of experiment 1 plus the respective exogenous shock simulated with the respective experiment.

Source: own simulation results based on economy-wide model for the Russian Federation

are aimed to support the domestic livestock industry and thereby also induce additional demand for domestic cereals, we will also discuss the respective changes in feed consumption.

TRQs on beef, pork, and poultry (exp. 2)

With the more flexible specification of our model economy (i.e. the long-run version of the model; see table 6), the introduction of TRQs on raw meat, causes the imports of beef and pork to decline by approximately 30%, those of poultry are affected only marginally. As the producer price for beef increases by 1.3% but production by 1.6%, a relatively high price-elasticity of supply is revealed. Again this is in line with what one would expect due to the long run specification of the model. In spite of this positive supply response, feed demand is not higher. Consequently, no significantly higher prices in domestic cereal markets can be observed.

The results obtained when simulating the introduction of tariff rate quotas for raw meat (exp. 2) with the first, i.e. the less flexible model are notably different: imports of beef and pork decrease by 26% and 30%, respectively, while poultry imports increase by almost 4%. Producer prices for beef and poultry increase between 4% and 6% as compared to the base year but there is no significant change in domestic production of these products, as it would be expected under a short-run scenario. Therefore and similarly to the long run scenario, this policy experiment does not result in higher domestic cereal demand and also has no stabilizing effects on cereal prices. However, the main explanation for these effects is the small share of raw meat imports in total domestic consumption in the base period (around 1% in all cases). In fact, in 1999 the major part of meat was imported as processed meat, hence trade policies affecting the trade regime for this commodity group may have a stronger impact.

Table 6. Statistically observed and simulated changes of Russian grain markets from 1999 to 2002

	Observed	Mobile	Rigid
Production	55%	55%	55%
Import	-82%	-42%	-43%
Export	1313%	974%	992%
Consumption	19%	4%	3%

Source: "Observed" changes from USDA and "simulated" changes from own model simulations (exp.1)

TRQs on processed meat (exp. 3)

The direct effect of an import tariff of 70% on processed meat in a situation in which the imported quantity exceeds 80% of the base year's level is a significant decline of processed meat imports of about 27% in both, the long run and the short-run model specification. This is partly compensated by higher domestic production (2% in the long run, 8% in the short run). The differences of the results indicate, that the producers of processed meat are much more flexible towards changes in the prices of their product than animal breeders, but the increase in domestic production is not a sustainable development and there are no significant feedbacks on the domestic animal production, which increases by only 2.5% in the long run. Hence, there is no effect on the domestic feed demand and no positive price-effect on the cereal markets. In contrast, one of the expected negative effect of such a policy measure is quite distinct: consumers have to pay higher prices for their processed meat, which together with other effects leads to an increase of the consumer price index (CPI) by 0.8% as compared with the base period.

In summary, the results of exp. 2 and 3 indicate that tariff-rate quotas for raw and processed meat products are not suitable measures to stabilize domestic producer prices in cereal markets. Even a combination of TRQ for both product categories will mainly harm consumers and does not promise significant gains for the agricultural producers in any of the farming structures. Because many grain producers recently had to limit their grain exports due to a lack of export facilities for grains in the major export harbors of the country, the next section will address this issue.

4.3.3 Improvement of trade infrastructure (exp. 4)

In this simulation, the trade costs for cereal exports were decreased by 50%. As mentioned above, this could be the result of an improvement in harbor infrastructure - a process which has been initiated both by private grain trading companies as well as the federal and regional government in the Russian Federation. It should be noted that 'total trade costs' consist of domestic transportation, handling and shipping at the point of sale, and thereby also other costs such as contract security, information on prices and trade partners etc. It also should be taken into account that the share of trade costs in relation to the domestic producer price depends highly on the traded commodity (KUHN, 2001).

The simulation results indicate that a decrease in trade costs would indeed stimulate additional exports (increase in the long term and the short run version by above 1 020%, compared to the other experiments, where export increase by some 900%). This reduces the pressure on domestic markets that has been induced by the increase in production. Hence, domestic producer prices for cereals would decline to a lower extent than in the previous experiments. At the same time the CPI increases to a lower degree in the short run and even decreases in the long run, compared to the first scenario, in which the cereal output was adapted to the situation in 2001/2002. In comparison to the introduction of TRQ in particular, consumers would be better off, since such a policy would lower and not increase consumer prices. Hence, it can be concluded that such a policy would not only yield favorable results for producers but also for consumers.

4.3.4 Trade liberalization (exp. 5)

With the following experiment we will simulate a complete abolition of all agricultural trade policies that were in place in 1999. This experiment is not simulated because it would be a very likely policy scenario but to contrast the previous experiments particularly the interventionist policies of simulation 2 and 3 with a free-trade scenario. Hence, while a complete abolition of agricultural trade policies is neither an option currently discussed with respect to Russia's agricultural sector, nor in any other country, it can highlight the trade-offs of such policies for the different actors in Russia's economy.

The most significant outcome obtained with both model specifications is a significant decrease of the CPI and an expected increase in total trade volume (overall exports 2.2%, imports 3.7%). Hence, consumers would benefit from agricultural trade liberalization. The results for the various types of farms differ according to the model specification. The main difference between both specifications is related to the development of value added for the different farm sectors. In the short run, the simulated trade liberalization has negative impacts on all farm sectors. Trade liberalization would compensate the gains, realized from the higher productivity of cereal production simulated with exp. 1. As expected, the negative effects of liberalization for farmers are higher than the positive effects from the TRQs or the decline of trade costs. However, while all of the protectionist measures did not cause any significant gains for any types of farmers under the long run scenario, trade liberalization would yield positive results when the long run version of the model is used. Hence, under the conditions of a flexible economy trade liberalization would be the first best policy option.

5. Policy conclusions and outlook

In this paper we provided an overview on the most recent developments in Russian cereal markets. A review of annual statistics on domestic production, trade, consumption, and storage of cereals revealed, that the respective change in Russia's net trade position cannot only be explained by increased productivity of grain producers. Instead exhausted storage capacities, the depreciation of the Rouble itself and the associated reduction in real trade costs following the devaluation of the Russian Rouble in 1998 seem to have contributed to these developments. It should be noted that due to the high share of natural resources in

Russia's exports the country is faced by the threat of Dutch Disease symptoms (cf. ALGIERI, 2004 and OECD, 2000). In the aftermath of the financial crisis the Rouble has continuously appreciated in real terms again which will also reduce the effectiveness of the macro-economic shield against food imports and thereby reduces the relative competitiveness of Russia's domestic agro-food sectors again. This trend may only be counter-acted if productivity growth in the country's agricultural sector improves substantially (LIEFERT et al., 2003).

An economy-wide model (a general equilibrium model) has been adapted to serve as a tool for analyzing some of the major policy instruments currently debated in Russia and to assess quantitatively the most important economic responses in more detail. Using the model we were able to show that some of the policies currently under discussion are less useful than others, and that their consequences differ significantly depending on the time horizon. Especially simulations concerning trade liberalization have shown, that in the short run, when the flexibility of labor and capital is restricted, market protection may actually benefit farmers. If, however, in the long run such structural rigidities can be abolished as a consequence of institutional change, a more liberal trade regime would also be positive for the domestic farm sector. In any case, neither of the discussed policies, except improvement of the trade infrastructure for exports (e.g. railway transport and port capacity), was suitable to stabilize the domestic grain market which suffered from the exceptional increase of domestic output between 1999 and 2002. Given the current input-output structure in Russia's agricultural sector, supporting domestic livestock production by increasing trade protection would not result in any significant increase of cereal consumption in this sector and therefore would not be a real relief for cereal producers. Again only long run investments into the domestic livestock sector and investments into trade infrastructure could significantly alter this.

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