The Kyrgyz Republic

Farm mechanization and agricultural productivity

FAO INVESTMENT CENTRE

COUNTRY HIGHLIGHTS

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ACRONYMS

ADB	Asian Development Bank
ABCC	Agribusiness Competitiveness Centre
BT	Bai Tushum
CC	Credit Cooperative
CU	Credit Union
EBRD	European Bank for Reconstruction and Development
FCCU	Financial Company for Credit Unions
F-IRR	Financial Internal Rate of Return
FSU	Former Soviet Union
GDP	Gross Domestic Product
GTZ	German Agency for Technical Cooperation
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IRR	Internal Rate of Return
KICB	Kyrgyz Investment and Credit Bank
KR	Kyrgyz Resources
MAWRPI	Ministry of Agriculture, Water Resources and Processing Industry
MFI	Microfinance Institution
NBFI	Non-bank Financial Institution
NBKR	National Bank of the Kyrgyz Republic
NPV	Net Present Value
NSC	National Statistical Committee
RAS	Rural Advisory Services
SIDA	Swedish International Development Cooperation Agency
TI	Technical Inspectorate
UNDP	United Nations Development Programme
VAT	Value-added Tax
WFP	World Food Programme

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ABSTRACT

This policy note reviewed the status of farm machinery in the Kyrgyz Republic. Agricultural productivity, particularly in terms of grain yields, is low because of underinvestment. This note finds that a significant deficit in agricultural machinery is hindering sector productivity. The Kyrgyz Republic has fewer tractors per hectare than any comparable country, with a deficit estimated at 40 percent. The deficit of combine harvesters, estimated at 45 percent, is even more critical. When the age of agricultural machinery is taken into account, the underinvestment becomes even more acute. The reduced domestic production of wheat exacerbates food security concerns.

Inadequate access to credit and small farm size are the main factors that constrain farm mechanization. The policy note presents three sets of short- to medium-term policy options to: i) promote the demand for farm machinery, by developing credit lines for agricultural productive assets, leasing, facilitating access to second-hand equipment, and testing/demonstrating the efficiency of farm machinery for small-scale farming; ii) increase the supply of farm machinery, by facilitating the development of mechanical services contracting and improving access to farm machinery import markets, including for second-hand equipment; and iii) remove obstacles to private investment, by avoiding distributions of farm machinery or inputs in-kind, the setting of production targets for specific crops, and ensuring that the private sector is free to fulfill its role.

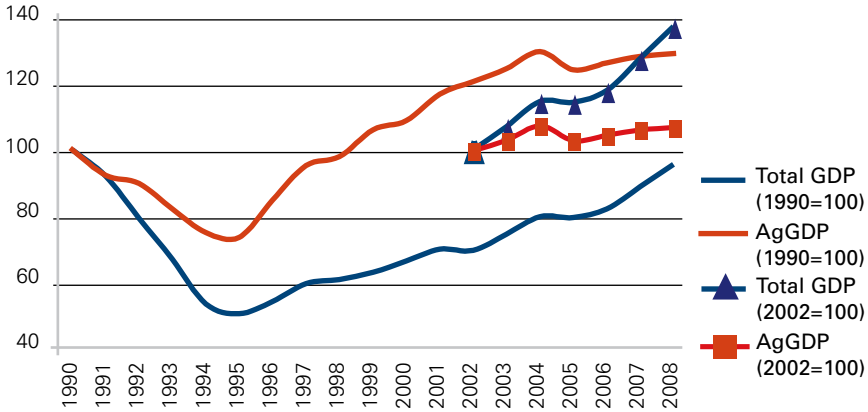
OVERVIEW

Objective. The objectives of this policy note are to: i) review the status of the agricultural machinery sector in the Kyrgyz Republic and assess its impact on agricultural productivity, with particular emphasis on wheat production; ii) examine the constraints to increased adoption of agricultural machinery; and iii) identify options for addressing these constraints. The note is not intended to be a comprehensive review of the agricultural sector. Wheat is chosen because it is an important staple food in the country and thus plays a central role in food security.

Agricultural productivity, particularly in terms of grain yields, is low because of underinvestment. This note finds that a significant deficit in agricultural machinery is hindering sector productivity. Inadequate access to credit and small farm size are the main factors that limit farm mechanization. The policy note presents three sets of short- to medium-term policy options to: i) increase the demand for farm machinery, by developing credit lines for agricultural productive assets, leasing, facilitating access to second-hand equipment, and testing/demonstrating the efficiency of farm machinery for small-scale farming; ii) increase the supply of farm machinery, by facilitating the development of mechanical services contracting and improving access to farm machinery import markets, including for second-hand equipment; and iii) remove obstacles to private investment, by avoiding distributions of farm machinery or inputs in-kind, setting production targets for specific crops, and ensuring the private sector is free to fulfill its role.

Performance of the agriculture sector. Kyrgyz agricultural output has been relatively stagnant since 2002. Agriculture's share in gross domestic product (GDP) declined from 34 percent in 2000 to 27 percent in 2008. Before 2002, agriculture was an important driver of the economy (as shown in Figure 1); in 2005 it suffered a sharp decline, from which it has not yet recovered. Yields of grains, which occupy about two-thirds of arable land, have declined by 18 percent since 2004, resulting in increasing imports of wheat grain, mostly from Kazakhstan (Figure 9, page 29). Livestock sector growth in 2008 continued to be moderate, as in previous years.

Figure 1
Kyrgyz Republic. Agricultural growth vs. overall growth



Source: World Development Indicators and NSC, 2008

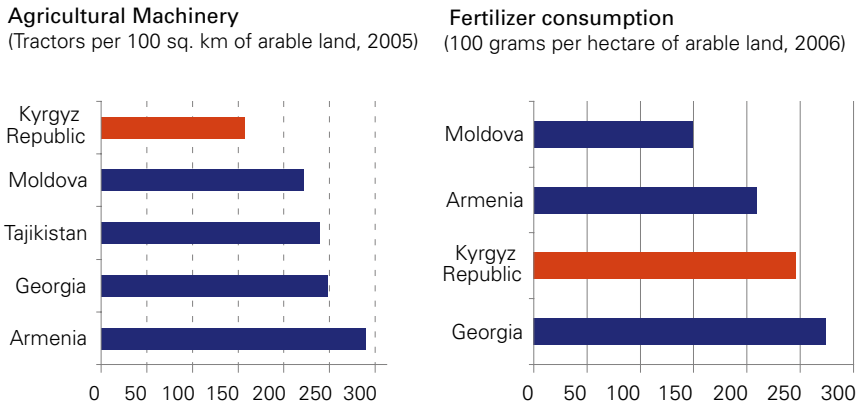
The main cause of weak agricultural and wheat performances is low private investment, particularly in farm machinery. The Kyrgyz Republic has fewer tractors per hectare than any comparable country, including Tajikistan (Figure 2). When the age of agricultural machinery is taken into account, this underinvestment appears even more acute: according to the 2003 Agricultural Census, only 9 percent of tractors and 14 percent of combine harvesters had been replaced since 1990. The problem appears to be less extreme for fertilizer use, although variations in soil fertility make this difficult to compare.

In May 2009, FAO carried out an analysis to estimate the equipment deficit (Chapter 2). The analysis compared the number of machines available with the average number needed for the cultivated area.[1] Figure 3 shows the major deficits in farm machinery that the analysis found.

It can be argued that such underinvestment is a consequence of low returns from agriculture, especially compared with those from the rest of the economy. Over the past five to seven years, other

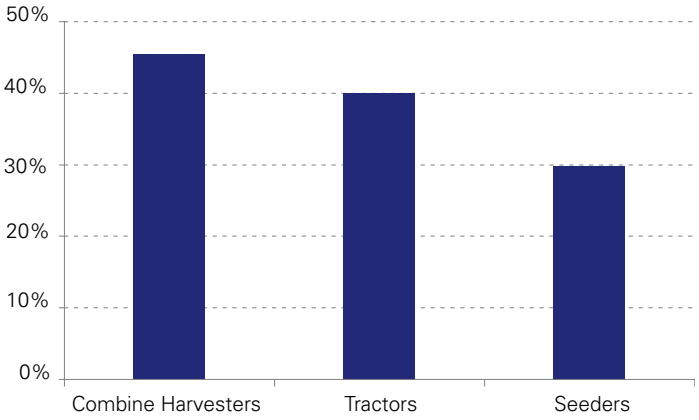
1 The needs for farm machinery were estimated on the basis of the following parameters: one combine harvester for every 200 ha of grains; one medium-sized tractor for every 40 ha; and one seeder for every 200 ha of sown area.

Figure 2
International comparison of private investments in agriculture



Source: World Development Indicators.

Figure 3
Kyrgyz Republic. Estimated farm machinery deficits



Deficits are those reported in Table 5 (page 34), with combine harvester needs modified by FAO
Source: FAO team, based on Ministry of Agriculture, Water Resources and Processing Industry (MAWRPI) data.

economic sectors (such as services and construction) have achieved levels of growth that clearly cannot be reached by agriculture. Agriculture is traditionally a more stable sector, which is unlikely to achieve spectacular growth, but is also more resilient to economic cycles than other sectors are. It is therefore possible that high returns in other sectors may have deviated investment resources from agriculture. Nevertheless, the sector maintained some profitability (as shown in Annex 1), and there are indications that investments may recently have increased in response to rising food prices.

The government estimates the overall needs for filling the agricultural machinery gap to be about USD600 to 700 million, which appears to be on the high side given the current machinery and equipment deficits. The FAO analysis revised the financial gap downwards, to about USD400 million, as shown in Table 1.

Most sector operators agree that the current lack of farm machinery is creating a critical bottleneck, because investing in quality seeds and fertilizer will not be sufficient to produce benefits unless seedbeds are prepared properly and crops are harvested in a timely manner. Lack of agricultural machinery has had a particularly negative effect on winter wheat, the sown area for which has decreased by about 22 percent (or 113 000 ha) since 2002. This has only in part been compensated for by other crops such as perennials, barley and legumes. The lack of farm machinery is directly limiting field crop productivity owing to:

(a) inadequate and delayed seedbed preparation;
(b) harvest losses because of old machinery and delayed harvests; these losses are estimated to range from 15 to 25 percent above the normal losses, and for 2007's wheat production would have resulted in a loss of 110 000 to 185 000 tonnes, worth USD25 to 40 million;
(c) high costs for land preparation[2] and, especially, harvesting operations;
(d) loss of fodder dry matter and its nutritional value – because grass cuts were too few, and were carried out at inappropriate vegetative stages – which is having negative effects on livestock.

2 Land preparation in the Kyrgyz Republic costs 55 percent more than in neighbouring southern Kazakhstan (after adjusting for fuel subsidies).

Table 1
International comparison of private investments in agriculture

Machine	Deficit (no.)	Average price (USD)	Total financial requirement (USD)
Tractors	11 111	20 000	222 220 000
Combine harvesters	1 415	100 000	141 485 900
Seeders	838	30 000	25 140 270
Total			388 846 170

Deficits are those reported in Table 5 (page 34), with combine harvester needs modified by FAO.
Source: FAO team, based on MAWRPI data

Clearly, no short term action can address a financial gap of almost USD400 million. The Kyrgyz Republic needs to adopt complementary strategies to address this challenge. While on the one side the country needs help to invest in farm mechanization, on the other side it should note the importance of high-value-added products that require less mechanization but can generate important export revenue. These include fruits, vegetables, livestock products and niche products such as dry nuts, yak or horse meat.

Lack of farm machinery is having a significant impact on farm productivity; at the same time, it is a consequence of other problems in the sector. Some observers blame the small farm size for these inefficiencies. Although, in number, 97 percent of farmers are subsistence farmers (defined as those with less than 5 ha of arable land), about 70 percent of arable land in the Kyrgyz Republic is used by commercial undertakings (Table 2). In addition, small farm size per se is not a cause of inefficiency – in many countries, small farms are extremely efficient. However, small farmers tend to be more efficient in high-value, labour-intensive products, such as fruits and vegetables. Capital-intensive grains require larger farm size. For example, manual wheat harvesting and threshing[3] require specific traditional skills that are not available in the Kyrgyz Republic.[4]

3 Threshing is the process of separating grain from stalks and husks.

4 However, manual harvesting of larger grains such as maize or sunflower, is less rare in the Kyrgyz Republic.

Table 2
Kyrgyz Republic. Farm structure

Farm type[a]	Number of farms		Arable land[b] (ha)		Average farm size (ha)
Subsistence	951 316	97%	408 047	31%	0.4
Commercial[c]	31 995	3%	897 290	69%	28.0
Total	983 311	100%	1 305 337	100%	1.3

a Includes all types of agricultural production unit (including household plots), but excludes farms without arable land (such as livestock farms with access to pasture) and 55 686 peri-urban gardens. (This explains the differences with Table 7, page 55)
b About 80 percent of arable land in the Kyrgyz Republic is irrigated.
c Defined as a farm with more than 5 ha of arable land.
Source: team elaborations based on 2003 Agricultural Census data.

Combine[5] harvesters present a particular challenge. They are large and expensive – the cheapest on the market costs about USD70 000 – and they are not versatile: they can be used only for harvesting grains, for a maximum of three to four months a year (where different types of grains are grown). In comparison, tractors are produced in many sizes and at many prices, starting from less than USD5 000 for a small hand-held two-wheel tractor (also called a motor-cultivator). Tractors are also far more versatile than combine harvesters; with suitable attachments, they can be used for soil preparation (ploughing, tillage, etc.) and many other operations, such as the distribution of fertilizers and pesticides, transport, water pumping and earth moving. The challenge for farmers is that a combine harvester is expensive, but can serve a large area of 200 to 250 ha. This is particularly challenging for smaller farmers; according to a sensitivity analysis, a farm needs to cultivate at least 100 to 150 ha of grains to make it worthwhile borrowing for a combine harvester. As few farms in the Kyrgyz Republic are larger than 100 ha, most farmers cannot afford to purchase a combine harvester, which explains its large deficit.

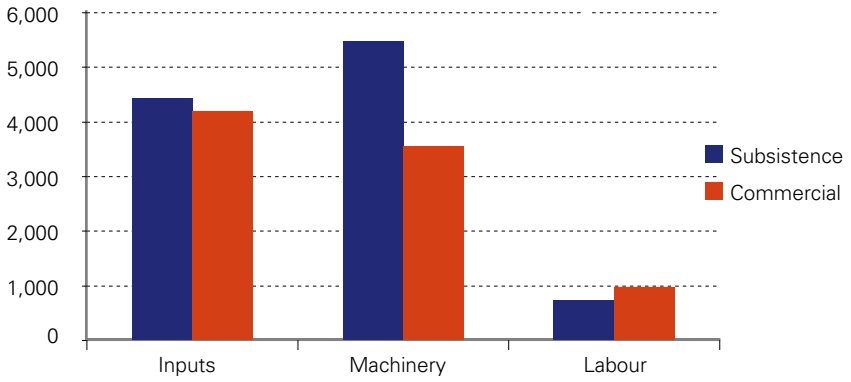
The lack of agricultural machinery affects both small and large farmers. Although fruits, vegetables and livestock are gaining importance among small farms, the cost of agricultural machinery

5 The term "combine" refers to the equipment's use in two combined operations: harvesting and threshing.

services for wheat production is 54 percent higher for subsistence farmers than for commercial ones. This is because commercial farmers own more machinery, and larger areas reduce the transaction costs for operating agricultural equipment. Even subsistence farms that make financial savings by using family labour, have production costs that are 20 percent higher than those of commercial farms (Figure 4).

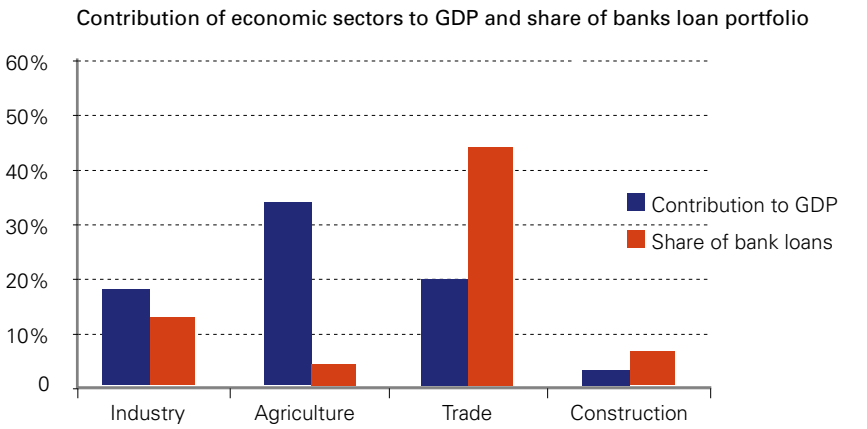
Lack of agricultural machinery is a consequence of several factors affecting both the demand for and the supply of machinery. Demand is negatively affected by the small farm size, the limited access to and unsuitable conditions of credit (e.g., short repayment periods that are not suitable for farm machinery), farmers' risk aversion, production farm inefficiencies, and government interference. When there are expectations of government subsidies for some services, investors may delay their investment plans, to benefit from the subsidized service or to avoid unequal competition with government-subsidized programs. The supply of farm equipment is also negatively affected by the relatively small size and dispersion of the market, and weaknesses in the private sector.

Figure 4
Kyrgyz Republic. Breakdown of wheat financial production costs*



* In soms per hectare, 2008. A subsistence farm is defined as a farm with less than 5 ha of arable land (excluding livestock farms with no arable land); see Chapter 1 – Impact of the 2007-2008 agricultural price increases.
Source: team estimates.

Figure 5
Kyrgyz Republic. Imbalance between agricultural GDP and lending



Inadequate access to credit is limiting the private sector's capacity to invest in farm machinery. Access to credit is a key condition for viable private sector development of agriculture. However, access to credit continues to be problematic for farmers in the Kyrgyz Republic. Over the past ten years, the agriculture sector has contributed between 26 and 35 percent of national GDP (at market prices), but its share in the overall lending portfolio of commercial banks has decreased from 21 percent in 2003 to 9 percent in 2009 (Figure 5). The availability of long-term lending for agriculture is limited: only 4 percent of total deposits have maturity periods of longer than one year, and there is limited access to outside capital markets. As a result, in 2007/2008 only 8 to 11 percent of lending for agriculture was for more than one year.

Leasing is a medium-term financial instrument widely used to finance movable assets such as machinery, equipment and vehicles.[6] Leasing schemes could develop more easily if Kyrgyz financing institutions were to explore the options for collaborative

6 The leaser remains the legal owner of the asset, while allowing the lessee to use it for an agreed period at an agreed rate. At the end of the period, the equipment is transferred to the lessee, sold to a third party, written-off or rented to another lessee.
7 Among the few examples of these are CNH Financial Services (www.cnh.com), CLAAS Financial Services (www.claas.com/countries/generator/cl-pw/en/services/financial-service/start,lang=en_as.html), John Deere Finance (www.deere.com/en_us/jdc/special_offers/ag/index.html) and Landini-Argo Finance (www.landini.it/sections/en/46/argo_finance.aspx).

arrangements with the financial subsidiaries of agricultural machinery manufacturers. Most machinery manufacturers offer a range of supporting finance schemes through associated or subsidiary finance companies,[7] and these provide an excellent alternative to traditional lending because of their lighter collateral requirements. However, this financial instrument is still used only rarely in the Kyrgyz Republic, where leasing operations had a total value of only USD1.7 million in 2008. Several factors are contributing to some development of leasing, including removal of double value-added tax (VAT) for leasing transactions (see Chapter 4 for more details on leasing and Box 3, page 20, on the new Tax Code). The limited experience of leasing so far shows how much demand there is for agricultural machinery, which has absorbed more than 54 percent of the total value of such leasing operations.

The already limited access to finance for agricultural production was further curtailed by the global financial crisis that set in during summer 2008, and the resulting credit crunch has had adverse consequences for agricultural producers. Given the limited long-term liquidity in the financial sector, financing for agriculture seems unable to match the increasing demand.

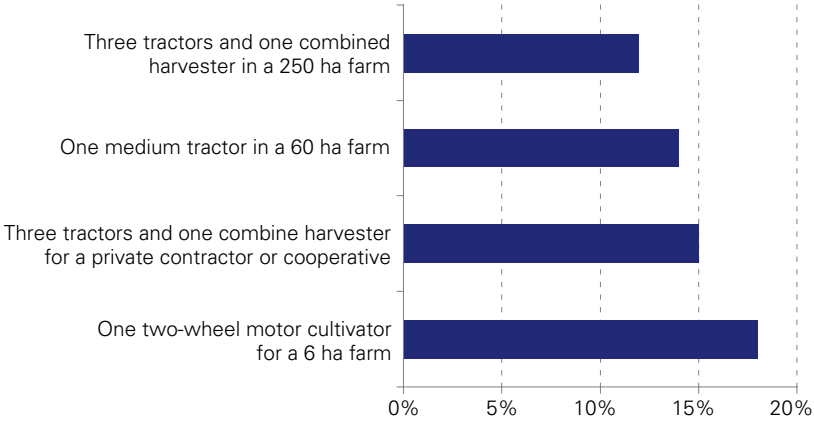
Adapting the approach to the farm size. The constraints faced by farmers vary significantly according to the size of their farms. A combine harvester can serve about 200 ha of grains, so only a few larger farms will be able to utilize one fully. Smaller farmers may either use machinery service providers (contractors) or join groups or cooperatives.

The expected financial returns on investments in farm mechanization in the Kyrgyz Republic were estimated for four packages of investment: i) one medium-sized tractor for a 60 ha farm; ii) three tractors and one combine harvester for a 250 ha farm; iii) one two-wheel motor-cultivator for a 6 ha farm; and iv) three tractors and one combine harvester for a private contractor or cooperative. The calculations show that investment in farm mechanization can increase productivity sufficiently to generate a positive return on the investment, but the estimated financial rates of return range from only 12 to 18 percent (Chapter 3, pages 43-50).

Table 3
Kyrgyz Republic. Farm size and access to mechanization

Farm size	Constraints	Approaches
Subsistence (less than 5 ha of arable land)	• Insufficient scale to afford most types of farm mechanization	• Support providers of farm machinery services
Medium farms (6–200 ha), cooperatives and providers of farm machinery services (contractors)	• Insufficient scale to afford large tractors and combine harvesters • Inadequate access to finance for purchase of small tractors	• Support providers of farm machinery services for grain harvesting • Test and demonstrate small tractors (starting with two-wheel motor-cultivators)
Large farms (more than 200 ha), cooperatives, providers of farm machinery services (contractors)	• Inadequate access to finance for purchase of farm equipment	• Facilitate access to finance

Figure 6
Kyrgyz Republic. Financial returns on farm mechanization investments



Source: FAO team estimates.

Experience of supporting farm mechanization: The government recognizes that lack of machinery is one of the main challenges currently facing the agriculture sector, and has been trying to address this, with support from donors. In 2009, the government allocated about USD1.8 million (75 million som) for machinery replacement. Between 1996 and 2002, a Japanese grant for agricultural machinery financed the purchase of 890 tractors, 209 combine harvesters and 177 mechanical seeders. This allowed the first significant replacement of machinery since independence. The initiative attempted to introduce a competitive distribution system for farmers through a decentralized screening process, but it registered the low repayment rates that are typical of any operation in which the public sector is responsible for targeting and directly involved in credit retailing (Box 1).

In 2006, a Chinese grant financed the purchase of about 1 200 small tractors, but some of the outcomes of this were counterproductive, as the experience of *Kyrgyzaiylservice* illustrates (Box 2). In this case the main problem was the provision of equipment in-kind, with farmers unable to select the makes and models most suitable to their specific farm conditions. When the farmers realized that they could not find spare parts, they stopped repaying their loans and the whole scheme collapsed.

Box 1
The Japanese grant for farm mechanization

From 1996 to 2002, farm machinery purchased under the Japanese grant was distributed among producers through the State Commission for the Distribution of Commodity Credits, with further allocation through oblast tender commissions. Oblast commissions advertised bidding in local newspapers, and bidders were asked to provide documented evidence of eligibility (registration as an entity, financial capacity, a business plan, assets for collateral, etc.). Bidders were also asked to contribute an indemnity payment of 1.5 percent of the cost of the procured machinery. Successful bidders contracted credit agreements with the State Fund of Economy Development, with repayment periods of three to four years, which were subsequently extended to five years. The Kyrgyz government received the grants free of charge, and used them to provide interest-free credit. Repaid credits were to be issued as new loans. As acknowledged by the government, farmers' repayment rates were low, mainly because of the public sector's low management capacity in retailing credits, insufficiently binding rules and regulations for borrowers, and changes in borrowers' status (which probably refers to farm failures).

Box 2
The experience of *Kyrgyzaiylservice*

A Chinese grant for improving farm mechanization was implemented through the State-owned leasing company *Kyrgyzaiylservice*. Some 1 200 pre-selected small Chinese tractors were provided on a loan basis to *Kyrgyzaiylservice* (with ten-year repayment periods at 16 percent interest). Some of these machines were initially retained by *Kyrgyzaiylservice* for its own farming business, while the rest were leased to farmers (with ten-year interest-free repayment periods). When difficulties arose in its farming business, *Kyrgyzaiylservice* distributed all the tractors to farmers, on the same lending conditions. The operation had some positive features, such as its focus on the main sector bottleneck and the opportunities it gave farmers to test small new machines from a supplier with low production costs. However, it also faced significant problems: i) many farmers were unable to find spare parts (because an adequate after-sales assistance service was not established), and refused to repay their loans when breakages occurred; ii) *Kyrgyzaiylservice* had to pay interest on its loan from the government, while distributing the tractors to farmers without interest; and iii) some farmers received used machinery. The operation was unsustainable, and *Kyrgyzaiylservice* went bankrupt. This represents a missed opportunity, and provides an important lesson about the risks when governments attempt to fulfill the private sector's role

These two experiences are interesting as they show how a good idea can face implementation obstacles when the Government attempts to assume the private sector's role. Under the Japanese grant, a government agency was responsible for selecting the borrowers of subsidized credits, and credit use was also narrowly focused on farm mechanization. In the Kyrgyzaiylservice case, the government selected the make and model of the tractors, and distributed them in-kind, without providing the full package of spare parts and after-sales support.

Linked to the lack of farm mechanization is the issue of food security. To address this, the government established production targets for some crops (including wheat) and exerted "administrative pressure" on farmers who failed to comply with these targets. In an open-market economy such as the one of the Kyrgyz Republic, this approach presents two risks:

(i) farmers are encouraged to exaggerate their true production, thereby undermining the accuracy of information on food availability in the country;

(ii) capital is diverted towards other, less distorted, sectors of the economy.

Pressure for the rapid creation and development of cooperatives may also be counterproductive. Such institutions need to develop independently and internally, led by their members, and this requires time and may not provide quick solutions.

The World Bank, the Asian Development Bank (ADB) and the International Finance Corporation (IFC) have financed some credit lines, including ones for agriculture, but almost none of these have been used for long-term investments such as farm machinery. One of the difficulties facing farmers and service providers is their limited capacity to pay high interest rates on long-term loans. (Repayment periods for expensive machinery have to be long – usually more than three years – and high interest rates significantly increase the financial costs of these.) Nearly all borrowing by farmers has therefore been for short-term investments, while machinery and other long-term productive assets are left to deteriorate. The government has often addressed this problem by subsidizing interest rates, but this approach distorts the market with the following consequences:

a) The funds allocated to interest rate subsidies are never sufficient to cover the whole target population, which often leads to rent-seeking and the need to select who will receive subsidies and who will not. This may result in credits being diverted from the most business-worthy borrowers.
b) It creates a disincentive for other investors to borrow at market interest rates, and these investors may delay their investment plans in the hope of obtaining subsidies:
c) It generates the impression that it is not feasible to borrow at market interest rates, even when this is not the case.
d) It undermines the viability of financial institutions, by not reflecting the true cost of capital. and
e) It incurs significant fiscal costs for the government, and may discourage repayment by borrowers who have not received subsidies.

There is interesting international experience of creating incentives for longer-term investments while mitigating the above risks. For example, a World Bank-financed project in Moldova adopted the matching grant approach, under which borrowers pay full market

Box 3
The new Tax Code

To improve the competitiveness of the Kyrgyz economy, a new Tax Code was put into effect on 1 January 2009, which significantly decreased the tax burden for all taxpayers by reducing the number of taxes (from 16 to 8) and significantly lowering tax rates, including VAT (from 20 to 12 percent) and profit tax (from 20 to 10 percent). Many improvements in tax administration were introduced, as well as a range of tax incentives. The new Tax Code includes provisions for incentives to the agriculture sector. The following are the most important incentives to agriculture:

- Income from the sale of agricultural products grown in the Kyrgyz Republic is exempt from income taxes.
- Agricultural producers and cooperatives of goods and service suppliers are exempt from profit taxes on industrially processed berries, fruits and vegetables (except those subject to excise tax), and agriculture credit unions are exempt from profit tax. Food and processing enterprises involved in processing agricultural products (except those subject to excise tax) are exempt from profit tax for three years.
- Land transactions, including leasing, are exempt from VAT, except for areas used for sales premises, parking of equipment and parking of transportation vehicles.
- For agricultural producers and agricultural cooperatives, the supply of own-produced agricultural and processed products is exempt from taxation.
- Agricultural cooperatives' supply of goods, labour and services to their members is exempt from taxation; food and processing industry enterprises involved in processing domestic agricultural primary products (except those subject to excise tax) are exempt from taxation for three years (according to a government-approved list).
- Imports and deliveries of grains and flour are subject to a 10 percent VAT rate until 1 January 2010.
- The supply of mineral fertilizers and plant protection chemicals to agricultural producers is exempt from VAT (according to a government-approved list).
- The supply of agricultural equipment produced domestically is exempt from taxation for three years (according to a government-approved list).
- Imports of agricultural breeding animals and seeds, fertilizers and plant protection chemicals, and vaccines and medication for animals are exempt from taxation for three years (according to a government-approved list).
- For business entities registered as VAT payers, imports of fixed assets for their own production purposes are exempt from VAT.
- For agricultural producers and agricultural trade-commodity cooperatives, imports of fixed assets for their own or their members' production purposes or for use by a business entity under a financial lease agreement are exempt from VAT.
- For transfers of fixed assets under financial lease agreements the interest receivable by the leaser is exempt from VAT.
- Agricultural producers and agricultural goods and services cooperatives are exempt from sales tax.

Private contractors providing services to farmers (including mechanization services) do not seem to benefit from any tax exemption.

interest rates, but if they will repay all the initial tranches without delay, the last tranche(s) will be waived. This has the important benefits of inducting borrowers into the culture of timely loan repayments, and rewarding the most responsible borrowers (who are usually also the most business-worthy).

Policy options. The government has an important role in helping the private sector address the lack of agricultural equipment, thereby increasing the efficiency of the whole agriculture sector, particularly cereal production. Although farm machinery is a purely private business activity, some government interventions may be justified because of agriculture's important externalities, such as its contribution to food security and employment generation in rural areas. For example, the government could:

1. undertake actions to develop the demand for agricultural productive assets;
2. facilitate the supply of farm machinery;
3. remove obstacles to private investments.

1. Undertake actions to develop the demand for farm equipment and, more broadly, agricultural productive assets. The government has various options for developing the demand for agricultural productive assets. The following are the main ones:

a. In the short term, the easiest step is to increase the availability of credit by *developing credit lines for agricultural productive assets*. A recent assessment by the High-level Task Force on the Global Food Security Crisis suggest this approach as a way of improving the food security situation quickly (FAO/IFAD/WFP/World Bank/UNDP, 2008). However, no additional funds have yet been made available. An interesting new option could be to use funds recently made available from the Russian Federation.[8]

   The design of such credit lines needs to be based on lessons learned during previous experiences. The credit lines should be implemented through existing institutions such as commercial banks, leasing companies, credit unions and other non-bank financial institutions (NBFIs) with appropriate capacity (Chapter 3). It should be kept in mind that the absorptive capacity of financial institutions is not limitless, so the amount of credit

8 MAWRPI prepared 14 proposals for these funds, but none concerned farm equipment.

made available to each financial intermediary should be based on a critical assessment of its current capacity and portfolio. A credit line should not be restricted to farm mechanization only, because farms' needs vary significantly and no financial institution or government agency is in a position to decide the specific needs of each farm. The credit line should promote the financing of long-term investments, such as for farm machinery or other productive assets (e.g., grain storage can play an important role in the grain commodity chain). A credit line allows support mechanisms with a less distorting impact on the financial sector (e.g., matching grants) to create incentives for longer-term investments. However, such support measures should be properly designed.

The following are some of the benefits of using a credit line through existing financial institutions:

(i) Implementation is easy and significant benefits can be produced in the short term, because existing financial institutions are used to provide loans to farmers.
(ii) The need to repay loans increases sustainability and reduces governance risks.
(iii) It promotes the development of a private sector retail network, in contrast to the direct distribution of inputs.
(iv) It can be effective even in weak institutional environments because it can operate through various intermediary financial institutions, including commercial banks, but also microfinance institutions (MFIs), credit unions and leasing companies.
(v) Its sustainability is enhanced by the use of reimbursed loans as revolving funds, allowing more of the target population to benefit from the initial funds.

b. *Further developing leasing* to ease collateral requirements: This involves: i) amending the Tax Code to reduce the disadvantages of leasing; ii) increasing the availability of long-term funding in the financial sector (combined with the development of credit lines); and iii) increasing the competitiveness of the insurance sector (Chapter 4).
c. *Facilitating access to second-hand equipment* should also be considered. The second-hand market is well developed for cars, so its limited use for farm mechanization is surprising. This could be improved by allowing the financing of certified second-hand equipment through credit lines (Chapter 5).

d. *Adapting the size of farm equipment to the small farm size:* Small tractors, such as two-wheel hand-held motor-cultivators, are very rarely used in the Kyrgyz Republic. The government could finance pilot demonstrations to test the technical and economic effectiveness of such small but versatile machines in Kyrgyz conditions.
e. *Investing in dissemination, transfer and knowledge sharing of technologies on farm machinery:* The Technical Inspectorate (TI) of MAWRPI and/or the Rural Advisory Services (RAS) (Chapter 5) could be used for this.

2. Facilitate the supply of farm machinery. This appears to be the most challenging of the three sets of recommendations. Nevertheless, some actions may have an important impact when combined with the previous recommendations:

a. *Facilitating and supporting the development of mechanical services contracting* in the form of service cooperatives or private contractors: A number of examples confirm the growing tendency for building farmers' organizational capacity through cooperatives, credit unions and individual enterprises (Chapter 5). These can be supported by: i) granting these organizations the same tax exemptions and sales tax/VAT-free conditions as are already granted to farmers;[9] ii) leasing land and other assets (e.g., workshops) belonging to the Former Soviet Union (FSU) Machinery Services; and iii) facilitating access to credit.
b. *Facilitating access to farm machinery import markets* by making the Kyrgyz market more attractive to foreign dealers, machinery manufacturers and their financial subsidiaries. Among other instruments, this could include tax exemptions.
c. *Supporting the importers of second-hand equipment*, by facilitating the development of quality certification, insurance and tax exemptions.

3. Remove obstacles to private investments. Some government activities, although designed with good intentions, may end up creating problems rather than solutions. It is important that the design of any supporting action gives full consideration to the current limited capacity of public and private institutions. In addition to continuing improvements in the overall business environment,

9 It is not clear whether the recently approved Tax Code exempts the providers of agricultural services from VAT and taxes on profits.

the government has the following options for removing obstacles to private sector investments in agriculture:

a. *Avoiding the distribution of farm machinery or inputs in-kind:* Such distributions hinder the development of private trading networks. In addition, there is limited capacity to provide the full package of services (including spare parts and post-sales assistance) or control the quality of agricultural inputs (seeds, fertilizers, etc.).[10] Facilitating access to credit through existing financial institutions is a more suitable option, as it helps to develop private trading networks and makes users responsible for controlling quality.
b. *Refraining from adopting the private sector's role:* The experience with small Chinese tractors described in Box 2 provides an important lesson. In this experience, the government's use of the State-owned Kyrgyzaiylservice as a substitute for the private sector's weaknesses in leasing ended up damaging an initiative that would otherwise have had important positive features.
c. *Avoiding the setting of targets for specific crops:* This is counterproductive because it creates an incentive for farmers to hide the truth about their actual production, which in turn affects the accuracy of statistical information, an area which is already problematic. Unreliable statistical information exacerbates food security issues.
d. *Avoiding the use of administrative pressure* to induce the private sector to implement public policies. This prevents constructive public-private relationships.

Conclusions

The Kyrgyz Republic faces substantial challenges to re-establishing the agriculture sector as the driver for growth and increased food security that it was in the late 1990s. The preconditions for this are increased investments and productivity. This brief note elaborates three sets of recommendations for facilitating investments in agricultural machinery. Although these are specifically directed to grain production, they would also support more general agriculture sector growth objectives.

10 Complaints about the quality of distributed inputs were not uncommon.

Table 4
Kyrgyz Republic. Summary of issues and policy options

Issue 1: Insufficient demand for farm machinery
Policy options: a. Develop credit lines for agricultural productive assets, including for agricultural production, with conditions such as loan sizes and repayment periods that are suitable for farm machinery. b. Further develop leasing to ease collateral requirements. c. Consider the possibility of facilitating access to second-hand equipment. d. Help adapt the size of farm equipment to the small farm size by testing and demonstrating the effectiveness of small equipment such as two-wheel motor-cultivators. e. Invest in dissemination, transfer and knowledge sharing of technologies and machinery.
Issue 2: Limited supply of farm machinery
Policy options: a. Facilitate and support the establishment of mechanical services contracting. b. Facilitate access to farm machinery import markets. c. Support the importers of second-hand equipment.
Issues 3: Obstacles to private sector investments
Policy options: a. Avoid distributing farm machinery or inputs in-kind. b. Refrain from taking the role of the private sector. c. Avoid setting targets for specific crops. d. Avoid using "administrative pressure".

Chapter 1 – Impact of the 2007-2008 agricultural price increases*

The food price increases of 2008 and Kazakhstan's consequent decision to ban exports of wheat grain between June and August 2008 had an important impact on the Kyrgyz Republic. The affordability of food was abruptly reduced, particularly for poorer households, which had to dedicate far larger shares of their incomes to food. With assistance from various international organizations, the government is implementing a social assistance programme to mitigate this problem.

Although it was obvious that food price increases would challenge consumers, some observers expected that they would have created favourable opportunities for food producers (farmers). This policy note is based on cash flow/financial analysis that was carried out to assess the impact of soaring food prices on agricultural producers and the agriculture sector. It focuses on the agriculture sector, and does not cover the challenges posed to consumers.

Farmers' benefits are lower than initially estimated. The 2007 to 2008 agricultural price increases were believed to be beneficial to agricultural producers (farmers), while damaging consumers. However, cash margin analysis shows that the benefits for farmers are lower than initially estimated. This is owing to the following factors:

- Input[1] prices increased together with output prices, so the costs of production increased in parallel with increasing revenue.
- Small farmers are producers and consumers at the same time. Subsistence farmers[2] consume a large share of their products, so do not directly benefit from increased output prices. Subsistence farmers have an opportunity benefit, in that they save by not having to buy increasingly expensive food products, but this saving is not evident in their cash flow, which instead suffers from increased input prices.

* Based on a cash flow/financial analysis carried out by Kunduz Masylkanova.

1 In this analysis, the term "input" is used broadly to include traditional inputs such as seeds, fertilizers and pesticides, plus machinery, fuel and labour.

2 The analysis assumes that about 5 ha of arable land is the minimum needed to feed an average family of five people and their livestock.

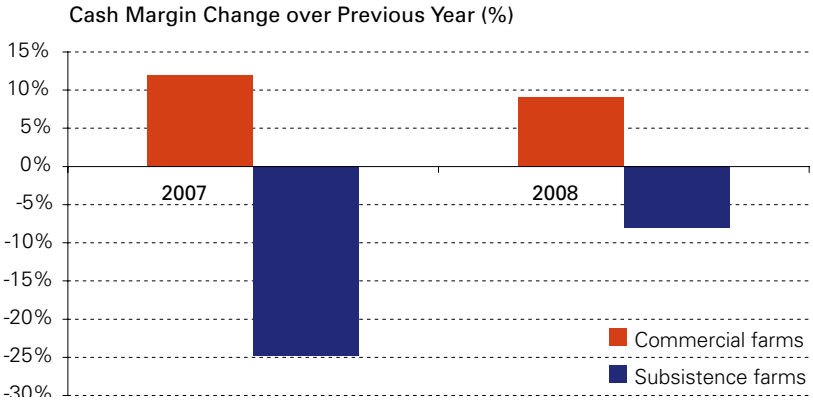
- Some crops (e.g., fodders, hay and some grains) are an input for livestock production, so the increased prices of crops have inflated the cost of producing livestock, thus eroding livestock profitability. Given the importance of livestock in the Kyrgyz Republic – its official contribution of 40.6 percent of agricultural output in 2007 may well be underestimated – the profitability of the overall agriculture sector (livestock plus crops) has not significantly increased.

Overall, the cash margins of the sector are estimated to have increased by 7 percent over the past two years, owing to price increases. According to the model built under this analysis, commercial farms – defined as those with more than 5 ha of arable land – are able to sell a good share of their products at higher prices, thereby increasing their cash margin by 21 percent (combining both crop and livestock activities). However, subsistence farms – those with less than 5 ha – do not sell a significant share of their production, so have mainly suffered from the increased costs of production, registering a cash margin drop of 32 percent (Figure 7). Commercial farms account for only 3 percent of all farms in number, but cover almost 70 percent of arable land (Table 2, page 12), so the benefits for commercial farms outweigh the losses for subsistence farms.

It is important to bear in mind that the model utilized in this note is a simplification of the reality. Cash margins in 2006, 2007 and 2008 were estimated on the basis of constant yields and cropping patterns, so changes are the consequence of output and input price changes only. In reality, however, the sector can increase its profitability by adapting cropping patterns, yields and production methods to the new prices.

Subsistence farmers account for 97 percent of the number of farms in the country, but cover only 31 percent of arable land, as shown in Table 2 (page 12). The higher prices of inputs and outputs are offering good opportunities only to commercial farmers, who represent an extremely small share of farms in number but a large share of agricultural area. It can therefore be deduced that the social impact of the new prices will be mostly negative, while improvements in efficiency may be substantial.

Figure 7
Kyrgyz Republic. Effect of price increases on farmers' cash margins



Source: team estimates.

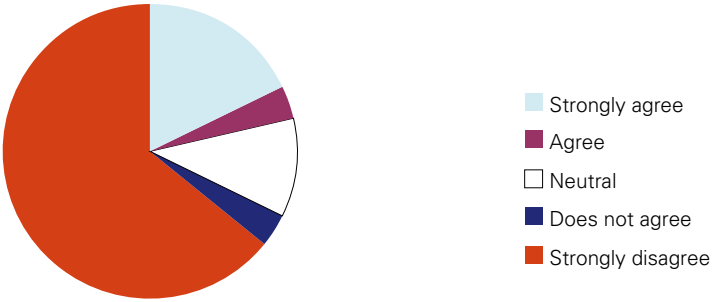
The conclusions based on the cash margin model (Figure 7) were confirmed by a small-scale survey in June 2008, when the large majority of farmers interviewed strongly believed that the recent price increases had not created an opportunity for developing the agriculture sector. At the other extreme, an important minority strongly believed that the new prices had created an opportunity for the sector. It is interesting to note how most respondents selected one of the two extreme answers (from a scale of 5, Figure 8), showing a strong polarization. This confirms that the new prices produced a majority of losers and a minority of winners. Although the June 2008 survey was not statistically representative, so the exact percentages are not valid, the trend is evident.

Wheat is the main food security concern in the Kyrgyz Republic.[3] The food price spike led to Kazakhstan's decision to ban exports of wheat grain during June to August 2008. This caused serious concern in the Kyrgyz Republic, where wheat imports from Kazakhstan have increased significantly over the past few years, and therefore also dependency on imports (Figure 9).

3 This note does not address the option of using grain reserves to improve food security. Such analysis requires significant effort and data availability and may be carried out under future sector studies if the government is interested.

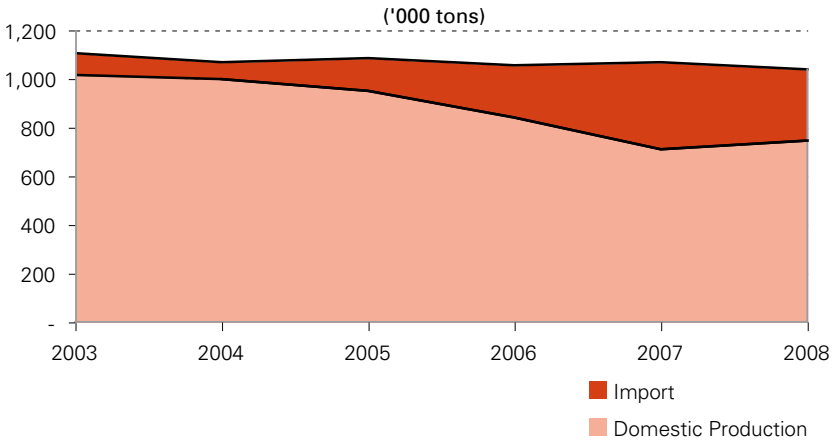
Figure 8
Kyrgyz Republic. Farmers' perceptions of the impact of new prices

Question: "The recent increase in food prices created an opportunity to develop agriculture" (June 2008)



Source: team estimates.

Figure 9
Kyrgyz Republic. Wheat grain trade balance*



The figure refers to grain only, so does not include wheat products such as flour and bakery products, imports of which have also been increasing.
Source: NSC

The trend for increasing wheat imports results from Kazakhstan's comparative advantage. In terms of both price and quality, wheat production is less efficient in the Kyrgyz Republic than in north Kazakhstan, because less arable land is available and climatic conditions are less favorable.[4] The area suitable for wheat in Kazakhstan is 10 to 15 times larger than that in the Kyrgyz Republic.[5] In addition, wheat in north Kazakhstan is rainfed, allowing lower production costs and higher quality.[6] In contrast, most wheat in the Kyrgyz Republic and south Kazakhstan requires irrigation, which increases production costs.[7]

However, although the profitability of wheat cultivation may be higher in north Kazakhstan, producing wheat and other cereals can still be profitable in the Kyrgyz Republic. As shown in the figures in Annex 1, the financial profitability[8] of wheat in the Kyrgyz Republic increased between 2006 to 2008, and ranges from 92 to 227 percent. Some crops appear to be more profitable than wheat, so farmers face challenging decisions about which crop to plant. Farmers do not usually shift rapidly to the most profitable crop, because it is not necessarily the least risky one. Farmers tend to adopt risk minimization strategies rather than profit maximization, although they seem to have been reacting rationally in 2008, by increasing wheat because of its increased profitability compared with other crops in most situations.

4 In north Kazakhstan, snow contributes to soil moisture, thus allowing relatively constant production even without irrigation.

5 The total arable land area in the Kyrgyz Republic is about 1.3 million ha, which is similar to the area covered by one single large farm in the north of Kazakhstan.

6 However, rainfed crops are more dependent on weather conditions, and suffer during droughts.

7 In Kyrgyz Republic, 80 percent of arable land is irrigated.

8 Gross of financial costs related to borrowings/credits..

Chapter 2 – Agricultural machinery in the Kyrgyz Republic*

A detailed analysis of the situation in the Kyrgyz Republic's agricultural machinery park was carried out during the latest Agricultural Census of 2003. At that time, the fleet numbers included 21 921 tractors (only 84 percent of which were considered operational); 2 836 grain combine harvesters (83 percent operational); 2 482 seeders (84 percent operational); 370 fodder choppers; 11 840 lorries; and minor numbers of potato harvesters, beet harvesters and cotton pickers. The great majority of this machinery was privately owned at the time of the Census. In 2008, the World Bank assessed the situation and provided general recommendations in a regional study (World Bank, 2008).

MAWRPI's TI is a normative and supervisory body responsible for monitoring the entire agricultural machinery fleet of the Kyrgyz Republic. In addition to its administrative role (fleet situation updates, issuing of plate numbers, technical passports, certification, driving licences, etc.), the inspectorate also carries out advisory functions on technical and financial matters regarding machinery and equipment, and is responsible for subsectoral budgetary estimates and State procurement matters. For example, it provides a very important service through its technical surveillance of farm equipment, ensuring that adequate safety standards are implemented and providing training in the proper use of farm equipment, etc. The TI has subnational units at the oblast and raion levels. It has a total staff of 87 and an annual operational budget of only 4 million soms (USD100 000). The TI issues annual updates on the overall availability and operational readiness of the whole fleet and agricultural equipment in the country. As of March 2009, 78 percent of the available tractors and 76 percent of the seeding equipment (based on the 2003 Census figures) were considered ready for operation. For combine harvesters, the latest situation report (2007) suggests that only 70 percent of the available fleet is ready. However, the availability and readiness of machinery should be compared with the real needs, in terms of the land areas actually cultivated.

* By Turi Fileccia

The Kyrgyz Republic has a severe deficit in agricultural machinery, particularly combine harvesters. The deficit is estimated as the ratio between available functioning equipment and the needs for the cultivated area (Table 5).[1] The deficit is 45 percent for combine harvesters, 40 percent for tractors, and 37 percent for seeding equipment. Regional deficits vary significantly: from 32 to 63 percent for combine harvesters (although there is a surplus in Naryn region); from 25 to 58 percent for tractors; and from 3 to more than 75 percent for seeding equipment. The major grain producing oblasts are constrained by the worst combine harvester deficits: Chui at 57 percent and Talas at 65 percent. Inter- and intraregional deficits and the different timing of operations imply that agricultural machinery travels from one area to another, providing some compensation of location-specific deficits. However, this also entails higher costs for mechanical services, owing to the relocation factor.

Tractor and seeding equipment deficits are estimated on the basis of the adjusted technical parameters used by the TI (one multi-sized tractor per 40 ha, and one seeder per 200 ha) compared with average sown area for the period 2005 to 2007. For combine harvesters, the TI's technical parameter (one combine harvester per 111 ha of cereals) was considered excessive, and a more economically valid parameter (one combine harvester per 200 ha)[2] was adopted.

The severity of the situation in the Kyrgyz Republic is even more evident when it is compared with the situation in similar countries, as shown in Figure 11 (based on 2003 Census data) for other FSU countries.

1 Information and data on availability and operational conditions were sought from several sources: MAWRPI and TI, information and data for March 2009; ***Agropress*** November 2007; and National Statistical Committee (NSC) data for 1999 to 2008.

2 This parameter was discussed with the relevant specialists in FAO.

Figure 10
Kyrgyz Republic. Equipment needs vs. deficit

Source: Team estimates

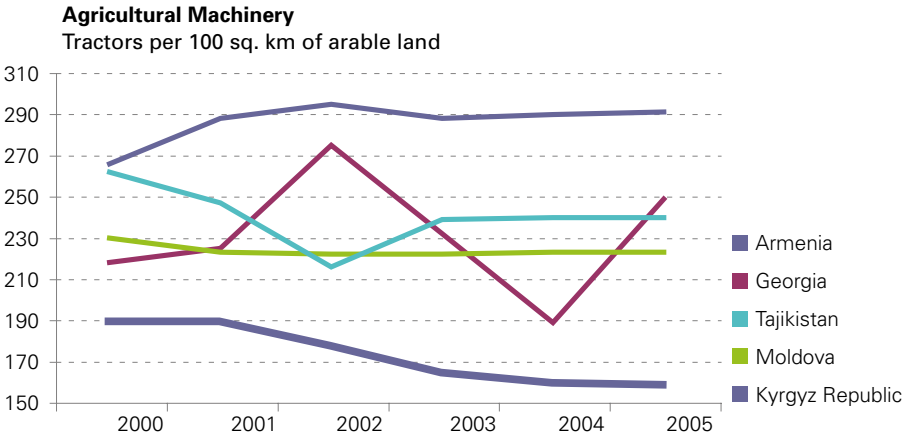
Table 5
Kyrgyz Republic. Main farm equipment deficits

Mechanical Means Situation as per Sown Area by Region (Sown area during 2005-2007)

	Sown area all crops ('000 ha)	%	Grains area ('000 ha)	%	Tractor need for av. sown area (based on tech. para.)	Operational tractors (reported 09)	Average Tractor Deficit	T. Deficit (%)
The Kyrgyz Republic	1,111	100%	624	100%	27,770	16,659	11,111	40%
Batken oblast	54	5%	35	6%	1,353	1,016	337	25%
Jalalabad oblast	144	13%	63	10%	3,603	2,412	1,191	33%
Naryn oblast	100	9%	36	6%	2,508	1,053	1,455	58%
Osh oblast	157	14%	94	15%	3,920	2,919	1,001	26%
Talas oblast	93	8%	58	9%	2,313	1,236	1,077	47%
Chui oblast	385	35%	237	38%	9,625	5,699	3,926	41%
Yssyk-kul oblast	178	16%	101	16%	4,450	2,324	2,126	48%

	Grain combine harvester need for av.grains sown area (estimated)	Operational combines (estimated 09)	Average Combine deficit	CH. Deficit (%)	Seeder need for av. grains sown area (estimated)	Operational seeders (reported 09)	Average Seeder Deficit	S. Deficit (%)
The Kyrgyz Republic	3,118	1,703	1,415	45%	3,118	1,971	1,147	37%
Batken oblast	175	77	98	56%	175	44	131	75%
Jalalabad oblast	314	182	132	42%	314	233	81	26%
Naryn oblast	182	252	-70	-39%	182	176	6	3%
Osh oblast	470	236	234	50%	470	291	179	38%
Talas oblast	291	106	185	63%	291	122	169	58%
Chui oblast	1,184	506	678	57%	1,184	837	347	29%
Yssyk-kul oblast	504	344	159	32%	504	268	236	47%

Figure 11
Trends of tractor availability among comparable countries

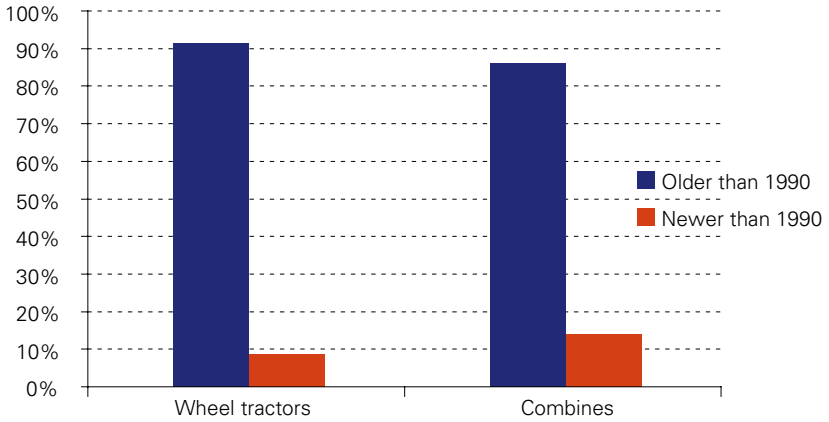


Source: World Development Indicators

Agricultural machinery in the Kyrgyz Republic is also technologically obsolete (Figure 12). Census results from 2003 show that 45 percent of tractors were produced before 1980, 46 percent between 1981 and 1990, and fewer than 2 000 between 1991 and 2003. Regarding combine harvesters, 28 percent were produced before 1980, 58 percent between 1981 and 1990, 12 percent between 1991 and 2000, and only 2 percent between 2001 and 2003.

Immediately after the collapse of the FSU and during the initial stages of land reform, the most powerful machinery was sold abroad because it was considered unsuitable for the new farm sizes. However, this large machinery was not replaced with smaller machines. Over the last 20 years, the replacement of machinery has been low, at about 1 percent a year (compared with standard replacement rates in the range of 5 to 7 percent a year). This 1 percent includes the 890 tractors, 209 combine harvesters and 177 seeders purchased through the Japanese grant during the 1996 to 2002 period (Box 1, page 17). Further support provided to the sector by the Chinese government, allowed the procurement of about 1 200 small tractors in 2006 (Box 2, page 18). The high repair costs for existing machinery have a major impact on farm competitiveness and production costs.

Figure 12
Kyrgyz Republic. Ageing farm machinery



Source: 2003 Agricultural Census.

Impact of the lack of farm machinery. Lack of agricultural machinery is one of the major limiting factors for crop[1] production, productivity and, particularly, the overall competitiveness of the agriculture sector. Sector stakeholders tend to agree that the current farm mechanization situation in the Kyrgyz Republic has contributed greatly to:

(a) decreasing overall sown area;
(b) high grain harvest losses due to old machinery, delayed harvests (by up to two or three months at some times and in some places) and, in the worst situations, failure to harvest;
(c) high costs for land preparation and, especially, harvesting operations (due to the unbalanced supply-demand ratios for tractors, seeding equipment and combine harvesters);
(d) inadequate soil and seedbed preparation, affecting productivity;
(e) improper plant protection and fertilizer management, caused not only by the unavailability of machinery for distributing fertilizer and pesticides when needed, but also because farmers do not invest in fertilizer when productivity is limited by inadequate seedbed preparation or harvest losses;
(f) loss of fodder dry matter (and its nutritional value) due to insufficient grass cuts carried out at inappropriate vegetative stages.

1 Food, cash and fodder crops.

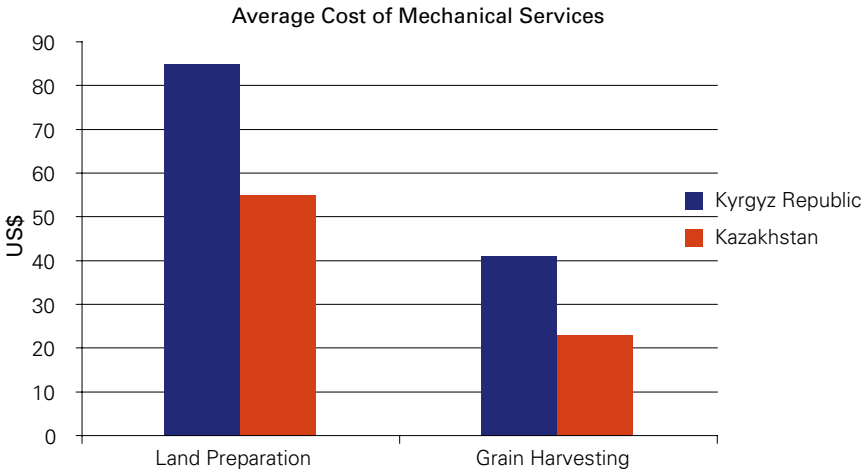
A major factor affecting Kyrgyz agricultural competitiveness and farmers' decisions regarding when, and sometimes even whether, to farm is the high prices of mechanical services. The machinery deficit (Table 5 and Figure 10, page 33) implies that a few owners supply mechanical services in an imbalanced manner to a large number of farmers. Compared with neighbouring (Figure 13) southern Kazakhstan's USD55/ha (in Zambyl and Almaty regions), full land preparation with hired tractor services in the Kyrgyz Republic costs 55 percent more, at USD80 to $90/ha. Harvesting operations using hired combine harvesters cost double, at USD40/ha in the Kyrgyz Republic, compared with an average of USD23/ha in southern Kazakhstan.[2]

There seem to be few, if any, cases of mechanical service contractors from neighboring oblasts in Kazakhstan moving to to the Kyrgyz Republic at land preparation or harvesting time. Although the economic conditions for this would be attractive, there are administrative and customs constraints. This may be an area for the government to examine, as a way of improving the availability of machinery when needed.

It is difficult to isolate the impact of the machinery situation from the other factors that affect overall cropped area, yields and competitiveness. Nevertheless, there has been a decreasing trend in net sown area over the last 20 years. The overall sown area declined from an average of 1.3 million ha during the FSU period, to 1.2 million ha from the mid-1990s to 2000. This downwards trend is continuing, with a further decrease in overall sown area of about 4 percent between 2000 and 2008 (from 1.21 to 1.16 million ha). It appears that the timely availability of machinery, seeding equipment and harvesting services plays a major role in farmers' decisions (and options) regarding the area sown at one time. The up and down inter-annual fluctuations in sown area suggest that changes to farms'/farmers' organizational capacity, the availability of mechanical

2 The calculation and comparison of mechanical service costs are based on information collected in Kyrgyz Republic and Kazakhstan through direct interviews with farmers, government officials, private companies, national and international research organizations, machinery dealers, staff of ongoing projects, and project designers. A wide range of crops and situations were compared and analysed using data collected in 2008 and 2009. Adjustments were made to correct the effects of fuel subsidies in Kazakhstan. Consideration should also be given to the relocation costs and smaller farm size in Kyrgyz Republic, which influence the prices of mechanical services because machinery is moved to distant farms and operates on numerous small farms.

Figure 13
Kyrgyz Republic and Kazakhstan. Average costs of mechanical services*



* Costs in Kazakhstan are adjusted for fuel subsidies
Source: FAO estimates

services and the affordability of such services are all more important determining factors than the structural and permanent issues (such as soil salinity and irrigation and drainage constraints)[3] that are often claimed as the most significant. This is confirmed by specialists from a seed project supported by the Swedish International Development Cooperation Agency (SIDA),[4] who consider that the country's inadequate agricultural mechanization level is hampering further progress in agricultural productivity.

3 For instance, following the On-farm Irrigation Project, which provided investment support to address drainage, salinity and water management issues, the cropping intensity of 63 water users' associations increased steadily from 2002 to 2005 over about 100 000 hectares. The increasing cropped area trend appears to have started to reverse in 2006, implying that other constraining factors started to have an influence (probably including the mechanization deficit). However, there is insufficient evidence to draw conclusions, and further analyses are required, as the database has not been updated to include information on 2007 and 2008 cropped areas.

4 Personal communication by project staff of the SIDA technical assistance project Support to Seed Industry Development in Kyrgyz Republic. This six-year project ended in 2009 and enabled the establishment of a modern seed industry, including plant genetic resources, plant selection, a seed quality and control system, registration and licensing of varieties, assistance to laboratories on certification and variety testing, technical assistance on seed treatment to pilot seed farms and enterprises, study/analysis of alternative agricultural crops, improvement of grain quality and resistance to diseases, and training and education in relevant sectors.

Lack of agricultural machinery has had a particularly strong effect on winter wheat, the sown area of which has decreased by about 22 percent (113 000 ha) since 2000. This has only partially been compensated for by other crops such as fodder perennials, barley and legumes (Figure 14). Typically, farmers claim that after harvesting the preceding crop, which is delayed by an average of one to two months owing to the harvesting machinery and services deficit, there is insufficient time to prepare the seedbed for winter wheat given the limited availability of tractors and seeding equipment compared with the demand. As a result, many of the farmers who rely on hiring mechanical services have to postpone seedbed preparation until spring. As shown in Figure 14, spring crops are mainly barley, beans and fodder perennials, which do not require land preparation every year.

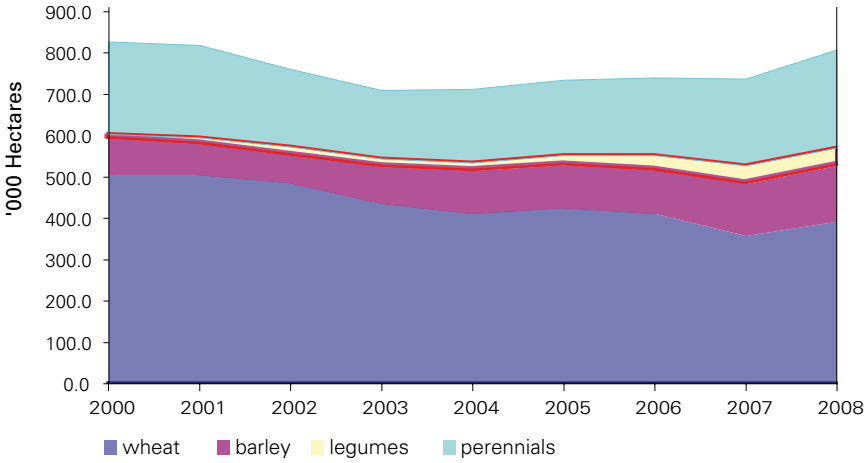
Another phenomenon of recent years (2003 to 2008) that affects productivity is the increasing share of spring wheat area[5] in total wheat area. This does not seem to be a winning strategy, as spring cereal varieties normally yield less than the corresponding winter cultivars, and the area lost to winter sowing is not recovered by the spring wheat crop. Over this period, some 41 000 ha of spring wheat yielded an average of 0.5 tonnes/ha less than the winter crop (totalling a loss of 20 500 tonnes), representing a loss in profitability of about USD50/ha, or a total loss of more than USD2 million.[6]

It is claimed that farmers have an incentive to cultivate their land in spring because this is when the credit lines that support working capital loans are replenished from the Republic's budget. If this is true, public funds should be managed so that they also support farmers who decide to plant towards the end of the year. Crop budget analyses show that wheat production is profitable even in the Kyrgyz Republic; in fact large and medium-sized farms continue to grow and profit from this crop. Undoubtedly, some other crops are more profitable in terms of returns on land and labour, but profitability depends on having a market that can absorb what is produced. Farmers in the Kyrgyz Republic have been cautious (Figure 14 - Trend in crop sown areas) in slightly modifying their cropping pattern following market developments.

5 Major certified seed farms report that the demand for quality spring cereal varieties has increased.

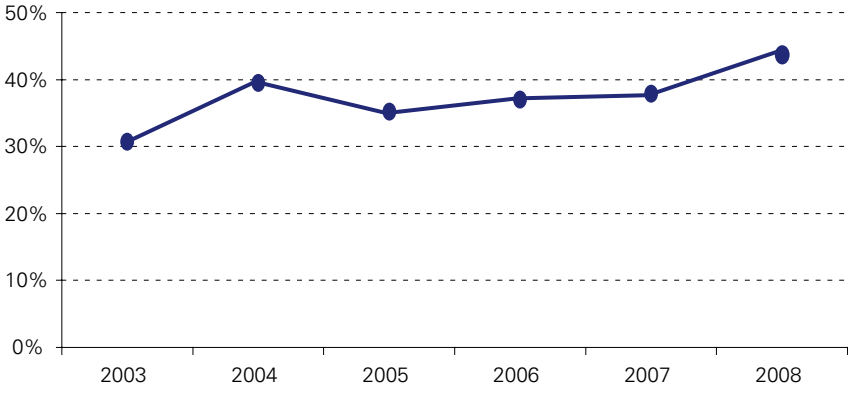
6 Statistical information on area, yields and production is derived from official NSC data; crop profitability data are sourced from analyses carried out for ongoing World Bank-supported projects.

Figure 14
Kyrgyz Republic. Trend in crop sown areas



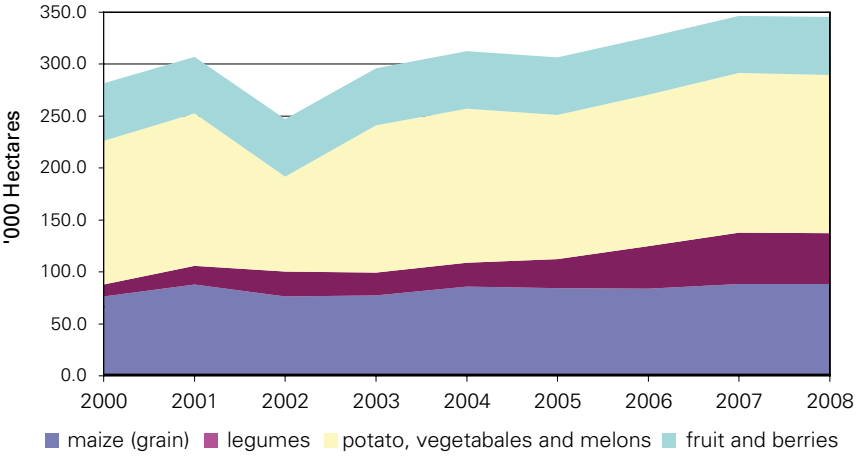
Sources: FAO elaboration of NSC data

Figure 15
Kyrgyz Republic. Share of spring wheat in total wheat cropped area



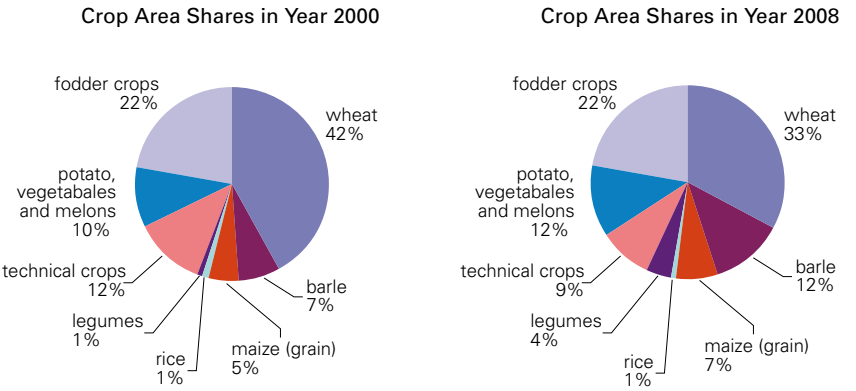
Sources: FAO elaboration of NSC data

Figure 16
Kyrgyz Republic. Trends in crops other than wheat



Sources: FAO elaboration of NSC data

Figure 17
Kyrgyz Republic. Comparison of crop area shares, 2000 and 2008



Sources: FAO elaboration of NSC data

The comparative advantage of Kyrgyz agriculture seems to be confirmed whenever there is investment capacity. A significant example of this is a Kyrgyz-Kazak joint agricultural enterprise created by a Kazak investor as a joint stock company, with Kyrgyz shareholders renting 4 500 ha in issyk-Kul oblast. The company produces cereals and oil crops (mainly soybean) and has made major investments in agricultural machinery.

Harvesting efficiency is directly related to the performance of combine harvesters. In this respect, two shortfalls should be taken into account: losses due to inefficiency, and losses due to areas being left unharvested because machinery is not available at harvest time.[7] Based on the information it collects periodically from combine harvester users, MAWRPI's TI estimates that current harvest losses are 15 to 25 percent higher than the normal technical losses associated with machinery use. Translated into value terms, and considering only wheat production for 2007 (709 000 tonnes), this would result in a loss ranging from 110 000 to 185 000 tonnes, amounting to USD25 to 40 million. Other important losses are attributed to productivity shortfalls due to inadequate soil and seedbed preparation (which practitioners estimate to be about 20 to 30 percent), and to fewer and belated fodder grass cuttings (estimated to be about 40 to 50 percent – or, in terms of dry matter production from a typical Lucerne field, a yield of 3 to 4 tonnes/ha instead of 6 to 7 tonnes/ha).

7 MAWRPI reports that the cereal harvest should normally be completed by the end of August, but it is now not unusual to see combine harvesters working until October or even November (making the timely preparation of seedbeds for the subsequent crop very difficult).

Chapter 3 – Machinery supply and financial services*

There are several signals that an active private sector – including dealers, representatives, country branches and assemblers of agricultural machinery – is beginning to emerge in the Kyrgyz Republic (Box 4).

Farmers in the Kyrgyz Republic also purchase second-hand machinery but only from the domestic market and of traditional brands for which spare parts are cheap, widely available and technologically familiar. The private sector is starting to offer

Box 4
Examples of agricultural machinery suppliers

Kyrgyz Resources (KR): The company claims an annual assembling capacity of 1 000 tractors of Chinese production. KR now has 30 staff members, has recently been restructured with State support, and reports that it is to be designated a State leasing company for agricultural machinery. It will keep its assembling activity separate from leasing, and does however intend to be limited to assembling only Chinese tractors. The government had planned to provide USD10 to 20 million a year for this purpose, but the global and national financial crises have made this unlikely. At the 2009 trade fair, KR exhibited Yenesei and NIVA combines, and Belarus and Chinese YTO tractors. It has agreed to represent Turkish New Holland suppliers and will also deal in spare parts.

Farmoni Ltd: This private dealer of Western European spare parts and machinery is the official dealer for Amazone, Krone and Grimme, and also represents Claas and Lemke. For Krone, specifically at the Agropark branch, it deals with reconditioned (ten to 15-year-old) high-power tractors, which are available for 30 percent of the price of new ones (all the mounted equipment is new). The preferred delivery mechanism is leasing for five to seven years, including for reconditioned machinery. The company's main target categories are progressive private farmers, who at present cultivate about 50 percent of the land. Although these farms are small, they have the potential to associate to form larger legal entities. Collateral issues can be dealt with by the grouping of assets or by increasing the down-payment from the normal 20 percent to 50 percent. A major need in the Kyrgyz Republic is for tractors of different sizes, and mounted equipment. The company provides pre- and after-sales services and training.

* By Turi Fileccia

reconditioned high-power (150 to 200 hp) tractors of Western European make (Box 4). No legal or administrative obstacles limit imports of used equipment and machinery. Purchases of used agricultural machinery have also been admitted by NBFIs, for both loans and leasing operations. Recently, second-hand car suppliers have started to include used tractors of Russian and Eastern European production, which the suppliers purchase when farmers order them.

Used tractors, combine harvesters, forage harvesters and root harvesters – the more expensive machines – are all traded extensively throughout Europe and the United States (Annex 2). The United Kingdom has registers of established second-hand

Agromach Holding Bishkek Ltd: This is a legal branch of Agromach Holding Russia, a consortium of Russian agricultural machinery manufactures. Initially (since 2004), the company was a representative of Agromach Holding Russia; Agromach Holding Bishkek was established in August 2008. Its mandate is to supply, lease, train and provide pre- and after-sales servicing, and it has a workshop in Bishkek. It promotes the formation of commodity service cooperatives, including Agromach Holding Technical Services, which was formed in December 2008 and has 200 members, mostly farmers but also including agroprocessors and service providers. In 2009 it participated in the national fair with eight units from the Russian Federation (including LTZ-60, a 60 hp tractor; T-30 69, a 30 hp tractor; DT 76, a 75 hp crawler tractor; and Yenesei 1200, a combine harvester). In 2008, it provided pre- and after-sales services for the 306 LTZ tractors bought by the government. It has also sold directly six LTZs, three KMZ 012s (a 12 hp tractor for small orchards), and two Yenesei combine harvesters.

Kyrgyz Avto Mach (JSC): This Russian enterprise is the licensed assembler for Belarus tractors (82.1) and Yenesei combine harvesters (1200 M), with prices 25 percent below those for imports. Its annual assembling capacity is 6 000 tractors and 1 000 combines. The plant has a railway slot and also manufactures radiators, which are mounted on assembled machinery. The aim is to cover the small domestic market and, mainly, the export market, having acquired rights for all of Central Asia and beyond. Its geographical focus is Uzbekistan and Tajikistan, with plans to serve Afghanistan and Pakistan. This year it will assemble 1 000 tractors and 100 Yenesei combines (80 for State procurement and 20 for private demand). It considers that 50 percent of the tractors it assembles are for the export market. It foresees supplying State procurement plans and the demand from other development projects, and has already directly sold 45 tractors in 2009. It provides guarantees for one year, with the promise of repair within 24 hours anywhere in the Kyrgyz Republic.

machinery brokers, which include the specialized reconditioning and recycling of spare parts for high-value machines. In Europe, the second-hand market is even more buoyant than the new one, and is mostly operated directly by farmers. The trade in used machines means that large farms can avoid becoming overstocked with machines that have become obsolete for specific local conditions, by offering viable trade-in values. It also helps smaller farms to afford mechanization. Used machinery has usually depreciated by at least 50 percent of its original value, making it generally unattractive for leasing companies. As a result, hire purchase is the normal finance method, in which ownership is with the farmer and a financing company advances up to 60 percent of the investment cost (Annex 3). Second-hand machinery of non-Russian/Eastern European makes is likely to become a market option in the Kyrgyz Republic, along with the development of a market for a wider range of new machinery brands and of pre- and post-sales services. The decision to purchase second-hand must be left to the farmer to make.

During the land and agrarian reform, a specific government resolution was issued in 1998, which envisaged the creation of technical services bodies to provide, among other activities, mechanical services to farms and farmers without agricultural machinery. More than 200 farms (large cooperatives and agricultural enterprises with significant machinery parks) organized themselves as service enterprises throughout the country. However, there was no formal registration or licensing, and the resolution did not have any legal follow-up to ensure advantages or provide incentives (such as preferential credit or leasing options) for the new service enterprises. Instead, these enterprises are subject to additional VAT (at 12 percent) and sales tax (at 4 percent). As a result, the activity did not develop, and the technical services companies that have survived (the numbers are unknown) operate through verbal agreements and are generally paid in-kind by client farmers. Given the small size of many private individual farms in the Kyrgyz Republic, a very

useful government action would be to support the formation of voluntary farmers' "machinery rings" and to facilitate investments in machinery contract servicing1 by individuals and organized groups, by allowing them and the farmers' machinery rings to use the same range of financing methods as private farmers and farm enterprises. The members of a machinery ring would own the machines cooperatively.

The performance of the financing sector, both banks and NBFIs (of which about 20 are active), is improving (Box 5). The sector is also increasing its involvement in agricultural business, albeit with meagre financial resources, high costs and unfavourable terms and conditions for farmers. Farmers who can are bearing these high interest rates and repaying their debts in time, for both short-term working capital loans and medium-term loans, mainly for purchasing machinery and equipment. The leasing experience in the Kyrgyz Republic may be small and rudimentary, but it has been showing encouraging investment potential for the sector.[2] The main leasing entities are Bai Tushum Ltd (BT; private) and the Financial Company for Credit Unions (FCCU; State-owned).

The government's understanding (and the financing sector appears to have acknowledged this) is that the demand for agricultural machinery is growing rapidly. The government will therefore enable procurement through its own financial resources (allocated according to financing institutions' lending capacity) and will welcome donor-supported initiatives and resources for this. The short-term needs for agricultural machinery provision are estimated to be about USD7 to 10 million.

1 Examples of organized machinery rings can be found at www.machineryrings.org.uk/; www.tayforth.co.uk/links.htm; and www.lothianmachineryring.co.uk/links.html.

2 For example, the IFC and Swiss government-supported Central Asia and Azerbaijan Leasing Project operated for more than six years (until April 2009) in Azerbaijan, Kyrgyz Republic, Tajikistan and Uzbekistan, and has recently handed over its mandate in Kyrgyz Republic to the Union of Banks (the national banking association). The project assisted two PFIs (Bai Tushum and the Kyrgyz Republic Investment and Credit Bank) with technical assistance such as specialized training, monitoring, legislative analysis and policy recommendations.

Estimates of the financial benefits of investing in mechanization in the Kyrgyz Republic were calculated for four packages of agricultural machinery: i) one medium-sized tractor for a 60 ha farm; ii) three tractors and one combine harvester for a 250 ha farm; iii) one two-wheel motor-cultivator for a 6 ha farm; and iv) three tractors and one combine harvester for a private contractor or cooperative. The estimates show that investments in farm mechanization can increase productivity sufficiently to generate a positive return on the investment, but the financial rates of return are not high.

In the case of irrigated wheat production, the ownership of one 78 hp tractor and relevant equipment can be justified for a 60 ha farm, providing a net present value (NPV) of about USD4 500 and a financial internal rate of return (FIRR) of 14 percent. This is based on an investment for one 70 to 80 hp tractor at USD25 000, plus other equipment at 50 percent of the value of the tractor, and the relevant financial costs for a five-year repayment period at 20 percent interest (to be repeated after 15 years) with a 10 percent discount. The assumed increase in wheat yield is from 1.9 tonnes/ha to 2.39 tonnes/ha, starting at 80 percent and valued at USD210/tonne. Operational costs of mechanization are calculated at 60 percent of hire prices, and harvesting costs at 100 percent. Incremental gross margins of USD131.5/ha (comparing with and without investment) are compared with the investment.

A higher mechanization level for irrigated wheat production, comprising three tractors and a combine harvester, is justified only for a farm of 250 ha, providing an NPV of USD10 000 and an F-IRR of 12 percent. This calculation is based on investment in three 70 to 80 hp tractors at USD25 000 each, and one combine harvester at USD100 000, plus the relevant financial costs for a five-year repayment period at 20 percent interest (to be repeated after 15 years) with a 10 percent discount. Again, the wheat yield increase is assumed to be from 1.9 tonnes/ha to 2.39 tonnes/ha,

starting at 80 percent and valued at USD210/tonne. Operational costs of mechanization are calculated at 60 percent of hire prices. Incremental gross margins of USD142/ha (comparing with and without investment) are compared with the investment.

Small farmers producing cash crops (e.g., tomatoes) and marketing their produce through contract farming would benefit from two-wheel motor-cultivators of 6 to 9 hp on farms of at least 6 ha (and with considerably higher returns on 10 ha farms), providing an NPV of about USD1 700 and an FIRR of 18 percent. The calculation is based on investment in one motor-cultivator of 6 to 9 hp and equipment at USD7 000, and the relevant financial costs for a five-year repayment period at 20 percent interest (to be repeated after 15 years) with a 10 percent discount. Tomato yields are assumed to increase from the current 13 tonnes/ha to 15 tonnes/ha, starting at 80 percent. Output is valued at only USD105/tonne, as in a contract farming agreement. The costs of mechanization are calculated at 60 percent of hire prices. Incremental gross margins of USD263/ha (comparing with and without investment) are compared with the investment.

Private contractors or service cooperatives providing mechanical services to farmers would generate adequate returns from investment in three tractors and one combine harvester (an NPV of USD26 000 and an F-IRR of 15 percent) if they service at least 300 ha and charge land preparation and harvesting rates, including transport services (which are discounted by 12 to 20 percent of the current rates charged by machinery owners in the Kyrgyz Republic), calculated at USD120/ha. Capital investment, financials cost and terms are considered as per the other cases.

Box 5
Examples of financing institutions operating with the agriculture sector

Financial Company for Credit Unions (FCCU): This was established as an NBFI by the National Bank of the Kyrgyz Republic (NBK) in 1997 through ADB and government support with funds allocated to the development of rural financial institutions (40-year loans with ten-year grace periods for 9 million soms). It is open to the members of credit unions (CUs) only. In 2005, it started leasing operations with a government guarantee fund, enabling CU members to purchase on lease: 131 Belarus tractors; four Ukraine Arcov tractors; two Amazone combined seeding machines; one Yenesei combine harvester; and trucks. NBK carries out financial assessment of the CUs and informs FCCU, which monitors the process. Defaulters are not eligible for further financing, but can register after a one-year freezing period and the repayment of outstanding loans. FCCU operates with about 200 CUs, which are ranked according to their histories. Lending operations start on a one-to-one basis, based on records, and borrowers can borrow over capital size up to a ceiling fixed in the regulatory document. CUs also obtain credit from other sources. Interest rates range from 18 to 20 percent (while leasing starts at 16 percent). Loan duration can be one, three or four years, and actual agricultural borrowing interest rates are 24 to 26 percent. Leasing of agricultural machinery has accounted for 80 percent of operations. The lessee becomes the owner of the good from the beginning, but cannot sell it until the outstanding loan is fully repaid. Under a recent agreement, the government will provide 75 million soms (at 12 percent interest) earmarked for agricultural machinery leasing. Leasing operations will be directly with CU members for a duration of seven years at an anticipated interest rate ranging from 12 to 16 percent (depending on the level of down-payment). CUs cannot guarantee for their members (which would require an amendment of the CU law) so the CU has to provide a 10 percent conditional guarantee, while the member advances a down-payment of 20 percent, plus collateral.

Credit cooperatives (CCs): These new NBFIs for microcredit are supported by the Cooperative Union. Legally, a CC can provide credit to individuals and legal entities and can borrow up to 3 million soms. The CC is eligible to obtain resources at favourable conditions from the Ayl Bank. The 75 million soms the government allocated to machinery purchase through leasing was supposed to be available to the cooperative movement, but as this sum is to be managed by FCCU, cooperatives will not be able to apply. This was the motivation for the Cooperative Union's promotion of CCs, and the union is seeking an agreement including the German Agency for Technical Cooperation (GTZ), the Agribusiness Competitiveness Centre (ABCC) and CUs.

Ayl Bank (formerly KAFC): Started in 1997 under the World Bank with government funding, this is now acting as a proper bank (an open joint stock company). At the moment, it can operate only in the local currency, but has applied for a licence for foreign currency operations, which would allow more flexibility in the products offered to its clients. Its credit portfolio is 2.4 billion soms, equal to 95 percent of assets. The loan record is 78 percent

for the livestock sector, 10 percent for crops, 11 percent for services and only 1 percent (or 20 million soms) for machinery (but this does not include spare parts and land preparation, which constitute a significant portion of loans). It is discussing with Reiffaisen Fund a USD5 million credit line for agricultural machinery, open to cooperatives. If Ayl Bank decides to engage in leasing, it will need to renegotiate this function with the World Bank. It manages 60 to 70 percent of agricultural credit (through 18 branches, 50 divisions in raions, and 33 offices at the village level). It has recently been authorized to practise subsidized credit, and will start soon with an interest rate of 22 percent and reimbursement of up to 10 percent of interest payments to borrowers on completion of debt repayment.

Bai Tushum (BT): This microcredit institution has a lending portfolio of 1.4 billion soms, 38 percent (560 million soms) of which is engaged in the agriculture sector. It ran a small pilot leasing scheme for one year, which is now under review (originally worth USD170 000 at a ratio of 50:50 between BT and UNDP, although BT then invested another USD30 000). The pilot is considered successful. However, BT is awaiting revision of the Tax Code to clarify a number of ambiguities that are hampering development of the leasing sector. Single loans are USD6 000 each, and borrowers have used 85 percent of the scheme to purchase second-hand machinery on the local market from sellers identified by the purchasers. There have been about 45 transactions (and more than 55 applications), each for a single investment. Terms are for a three-year leasing period with interest rates of 18 to 22 percent. Property remains with the leaser until repayment of the loan. Collateral is requested (unmovable goods), while the amount depends on the down-payment and the availability of a third-party guarantee. This is because BT's insurance company does not cover second-hand goods. There has been only one defaulter with delayed payment. Financial assessment is carried out by BT, and lessees' cash flow and liability are assessed. Lessees are farmers with 2 to 3 ha. BT has seven branches and 29 sub-offices, and more are planned. Its normal credit operations include: agrocredit (for crop and livestock), 38 percent; group credit (no collateral, joint responsibility), 14 percent; trade/services/production, 42 percent; consumer credit; and mortgages. Agrocredit has more favourable interest rates, of 2 to 3 percent less than the others, and is provided for one to two years; credits are for 70 000 to 85 000 soms, and are used for working capital purposes (including land preparation). Concessional, long-term financial resources are sourced through the European Bank for Reconstruction and Development (EBRD), the World Bank, IFC, UNDP, etc., as the national market is extremely expensive. BT can operate only in the local currency.

Chapter 4 – Leasing in the Kyrgyz Republic*

Leasing in the Kyrgyz Republic started developing in 2002, and by the end of 2003, 165 leases had been financed for a total value of around USD1 million. Three banks were involved in leasing, as well as FCCU, which works exclusively in the credit union system. The lease portfolio was heavily tilted towards the agriculture sector: 36 percent was for agroprocessing equipment, with a further 33 percent financing agricultural equipment.

However, since then, leasing activities have slowed down significantly, and from 2005 to 2008 only 238 leases were provided for a total of USD3.8 million. By comparison, over the same period in Uzbekistan, almost 21 000 leases were provided for a total of USD625 million. Two commercial banks (the Kyrgyz Investment and Credit Bank and BTA Bank [formerly Ineximbank]) and two MFIs (FCCU and BT) worked in the leasing market at different times during 2005 to 2009. The share of agricultural leases has varied enormously, as indicated in Table 6, depending on the players in the market and the situation of the overall economy (e.g., high-value processing of foodstuffs in 2007 resulted in increased demand for agricultural machinery in that year).

Although considered an excellent alternative to traditional loans – owing to the lighter collateral requirements for lessees and easier repossession procedures in case of default for leasers – leasing has never taken off in the Kyrgyz Republic. A number of donors have provided the financial sector with extensive technical assistance to promote leasing (e.g., IFC), or considered making

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Table 6
Kyrgyz Republic. Leasing operations and agricultural machinery

	2005		2006		2007		2008	
	Number	Value ('000 USD)	Number	Value ('000 USD)	Number	Value ('000 USD)	Number	Value ('000 USD)
Leasing operations	51	172	29	1 270	44	612	144	1 704
Of which agricultural machinery	7	111.5	8	152.9	43	603.0	91	55.8
		65%		12%		99%		3.3%

Source: IFC leasing project data and author's elaboration.

equity investments in leasing company (e.g., EBRD and IFC), but several factors have resulted in very few leasing transactions going forward. These factors include: i) a tax system that treats leasing differently from lending, in some cases leading to double VAT on leasing transactions; ii) a lack of the long-term resources in the financial sector that are crucial for leasing development; iii) cumbersome requirements for beneficiaries, as leasers request either substantial cash down-payments (of up to 50 percent of the lease amount) or additional collateral; iv) for beneficiaries, the greater expenses of leasing compared with traditional loans, due to insurance costs and the additional commission payments required by leasers; v) the limited secondary market for assets, especially for specialized equipment, making leasers cautious about ending up with assets they cannot sell (and without additional collateral); and vi) for leasers, the high operating expenses on lease transactions, which have smaller margins than traditional loans.

Leasing seems to have been relatively more successful in the microfinance sector. Two active microfinance companies – FCCU (since 2005) and BT (since late 2007) – have provided 200 leases for a total of almost USD3 million. All micro-lease transactions have supported the purchase of tractors (predominantly MTZ

tractors from Belarus) and/or implements. Both companies continue to work in the leasing market, while commercial banks have pulled out for the time being.

The new Tax Code of 2009 has removed the differences in VAT treatments between loans and leases. The overall expectation is that leasing should now start to develop, but the new Tax Code has also introduced a sales tax, whose applicability to leasing transactions is not clear. Such a sales tax on leasing transactions would clearly put them at a disadvantage compared with traditional loans. The IFC's Leasing Project (which closed in March 2009) has provided extensive guidance and advice on development of the leasing sector. Since this project closed, further efforts to amend tax legislation and promte the leasing market now lie with the Association of Banks of Kyrgyzstan.

The following are recommendations for developing leasing:

- Amend the Tax Code to reduce the disadvantages of leasing (and possibly create tax incentives to promote it).
- Increase the availability of long-term funding in the financial sector (e.g., by raising funds for leasing credit lines from donors and suitable lenders).
- IIncrease the competitiveness of the insurance sector to make it more affordable.

Chapter 5 – Trends in farmers' organization*

The current farm mechanization structure in the Kyrgyz Republic was inherited from the Soviet farm organization system. State-controlled machinery schemes were implemented in each region according to local cropping systems, soil types and, especially, farm sizes. The system was designed to meet the needs of 470 collective farms (195 Kolkhozes and 275 Sovkhozes), with an average size of 2 590 ha of arable land each. After independence, the Kyrgyz Republic undertook a land privatization process, which progressed rapidly and led to the reallocation of farm machinery to a few new large cooperatives and many individual small farms. Initially, some ex-Kolkhozes transformed into new cooperative structures sold their machinery to neighbouring countries to monetize their assets. A very different agricultural structure emerged from this process, dominated by production from small individual private farms and household plots. Table 7 shows the evolution of the prevailing farm structure. The situation has changed since 2002, and land operated by individual farmers and smaller cooperatives now accounts for about 77 percent of total land (thanks to the leasing operations of cooperatives).

For the donor community, the post-independence farm structure depicted in Table 7 and the prevalence of small farms provide a strong argument against the need for significant long-term investment in mechanization, and justify the focus on other production/productivity constraining factors, such as the

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Table 7
Kyrgyz Republic. Structure of farm types

Farming category	Households	Private farms	Agricultural enterprises	State: Land Redistribution Fund
Number of units	881 713	251 526	1 326	
Share of total arable land	5%	75%	14%	~ 6%
Arable land (55000 ha) (total: 1 411 000 ha)	70.55	1 086.5	254.0	~ 80 000
Share of employment in agriculture	35%	52%	13%	
Share in agricultural value-added	38%	59%	3%	
Share of total agricultural output	55%	40%	5%	

Source: World Bank, 2004, and elaboration in 2009.

needs for support services, capacity building, supply chain competitiveness, and irrigation infrastructure rehabilitation.[1]

Average private farm sizes vary depending on regional location: while southern farms are seldom more than 2-3 ha, those in the north range from 3 to 12 ha in the Chui valley to 6 to 7 ha in other northern areas. However, a common pattern across the country is the joint farming of two or three land plots owned by individuals in the same family, which results in more profitable farm sizes of 10 to 30 or 40 ha. Although attempts to increase farm size through consolidation/unification policies and activities have achieved limited results, the support and assistance that a few donor programmes have provided to build up a genuinely cooperative system for smallholders are showing some initial success.

Donor-supported programmes and projects have had considerable results in building small farmers' capacity and business orientation. For example, the World Bank-supported

1 An updated list of agriculture sector projects in Kyrgyz Republic is available in the December 2008 ***Bulletin*** prepared by specialists of the Policy Support Project and the Directorate for Agrarian Policy and Investments in MAWRPI.

Agribusiness and Marketing Project (operated through ABCC) supports the Cooperative Union and 200 of the Kyrgyz Republic 900 registered cooperatives. Although many of these cooperatives exist only on paper, it appears that at least 250 can be considered true agricultural businesses, including those organized by the Cooperative Union. The system is organized around three levels: the first deals with production and currently has 200 entities; the second aggregates first-level cooperatives and focuses on services (information, input supply, produce collection, storage and marketing), with about five cooperatives covering about 140 to 150 first-level entities; and the third level is still to be developed.

The Cooperative Union has recently supported the creation of CCs (Box 5, pages 49-50) as a means of providing credit to individuals and legal entities (such as cooperatives and their members). The CCs are being established on a voluntary evolving basis, and more than 60 percent of the first-level cooperatives are considered stable. Size varies from small aggregates of 15 members to much larger ones with 1 800 and up to 4 500 members. The 2004 Law on Cooperation gives cooperatives the right to claim State redistribution land,[2] and about 50 percent of the reserved land appears to have been attributed to cooperatives. The average farm size of the assisted cooperatives is about 60 ha, although some are larger, at 700 to 900 ha, and one of almost 8 000 ha. Overall, the 200 cooperatives farm 18 000 ha (55 percent owned by members and 45 percent leased by the cooperatives from the State Land Redistribution Fund). However, the tendency is for members to contribute an average of only 30 to 40 percent of their lands to the cooperative, retaining the rest for individual farming. If the cooperative agricultural businesses achieve increased returns on land and labour, this remaining land will eventually

2 The distribution agreement is organized by the Ayl Okmotus (local authority) and should be managed through tenders. Land is granted on five-year leases, which can be renewed as needed.

be assigned to the cooperatives, which for the 200 that already exist would represent an additional 18 000 to 40 000 ha. The project assessment found that 80 percent of the cooperatives declare[3] agricultural machinery and equipment as their first investment priority. A forthcoming agreement among ABCC, the GTZ-Reiffaisen Fund[4] and the Cooperative Union is expected to provide USD0.8 million as matching grants for cooperatives' long-term investments in agricultural production (including machinery) and primary agricultural processing. The matching grants would leverage an additional USD2 million, to reach almost USD3 million. All 200 cooperatives are eligible to submit loan applications and it is anticipated that agricultural machinery investment requests will be the majority.

Another example of farmer organization in the Kyrgyz Republic is the Credit Union (CU) system (Box 5, pages 49-50). To date, there are 255 CUs, mostly in rural areas and all involved in agricultural activities. Each CU has about ten members depositing at least 30 000 soms (USD750), which the CU uses to start up its lending operations, recapitalizing based on the gains. Normal credit activities are for agricultural working capital needs in spring and autumn. Loans to CUs are provided by FCCU for on-borrowing by CU members only. Since 2005, FCCU has supplied on lease to CU members: 131 Belarus tractors; four Ukraine Arcov tractors; two Amazone combine seeding machines; one Yenesei combine harvester; and trucks.

RAS is an NGO-type structure that is considered responsive to farmers' needs. Although it still operates through donor support,[5]

3 Personal communication, Director of ABCC.

4 This is a German government initiative to support the cooperative movement. Started in 2003, it now covers all of Kyrgyz Republic, either directly of through associated organizations, and counts about 35 000 staff members. It interacts with several other projects, including the World Bank's Agribusiness and Marketing Project.

5 Supported by the Agricultural Investment and Services Project of the Swiss government, the World Bank and IFAD (with additional supported from GTZ, the Aga Khan and ADB, which supports individual RAS branches).

it has evolved into an autonomous organization servicing farmers and seems financially sustainable (farmers currently contribute 5 to 10 percent of costs). It has six branches in all regions and a raion-based network of trained RAS advisers covering the technical spectrum according to local farming systems. Its approach is to use participatory needs assessments to identify constraints and opportunities and to prioritize interventions based on the availability of financial resources. RAS has promoted and facilitated the organization of farmers into common-interest and self-help groups, with an average of eight to 15 members each. These groups are registered at the raion level and have a legal status that is also acknowledged by MFIs. Membership ranges from 10 to 15 percent of the local farming population. Networks of farmers are being formed for marketing purposes and, particularly, access to financing institutions, but loan/lease conditions (including repayment periods and interest rates) are still unfavourable for most small farmers. Farmers have to make informed decisions about the type of machinery or other inputs, based on the profitability of the investment and local production systems. RAS can assist farmers' decision-making and business planning and, if required, can upgrade the training of advisers.

Individual farmers and cooperatives, many of which grow vegetables, are increasingly establishing contract arrangements for new or reconditioned agroprocessing units. For example, the Tokmok canning factory, which processes tomatoes and cucumbers produced in the Chui valley, has formal contract growing agreements with growers under which the grower produces an agreed quantity of vegetables from an agreed area and at a fixed price (which is a tenth of the price in the fresh market). The factory provides the grower with certified seed of the specific variety at greatly discounted prices (a fifth of the market price), and an assured market outlet.

A number of examples confirm the growing tendency for buildings farmers' organizational capacity though the establishment and support of cooperatives, credit unions, and individual enterprises. In addition, a few large enterprises are gradually improving their management and business structures.

A rough estimate of the medium-term needs of organized farmers and cooperatives,[6] in terms of tractors, seeding machinery and combine harvesters, would be as follows:

- organized private farm area: 125 000 ha (10 to 15 percent of the area in the private farm category);
- progressive large farm area: 125 000 ha (50 percent of the area in the large farm category);
- tractors: 4 000 units (of 40, 60 or 150 hp, based on one tractor/60 ha);
- seeders: 800 units (of various capacities, based on fulfilling current normative needs);
- combine harvesters: 1 000 units (based on one combine harvester/250 ha).

6 This area of 250 000 ha for organized and progressive farmers is based on discussions with sector practitioners and major ongoing project management staff.

ANNEX 1
Financial analysis of crops in the Kyrgyz Republic*

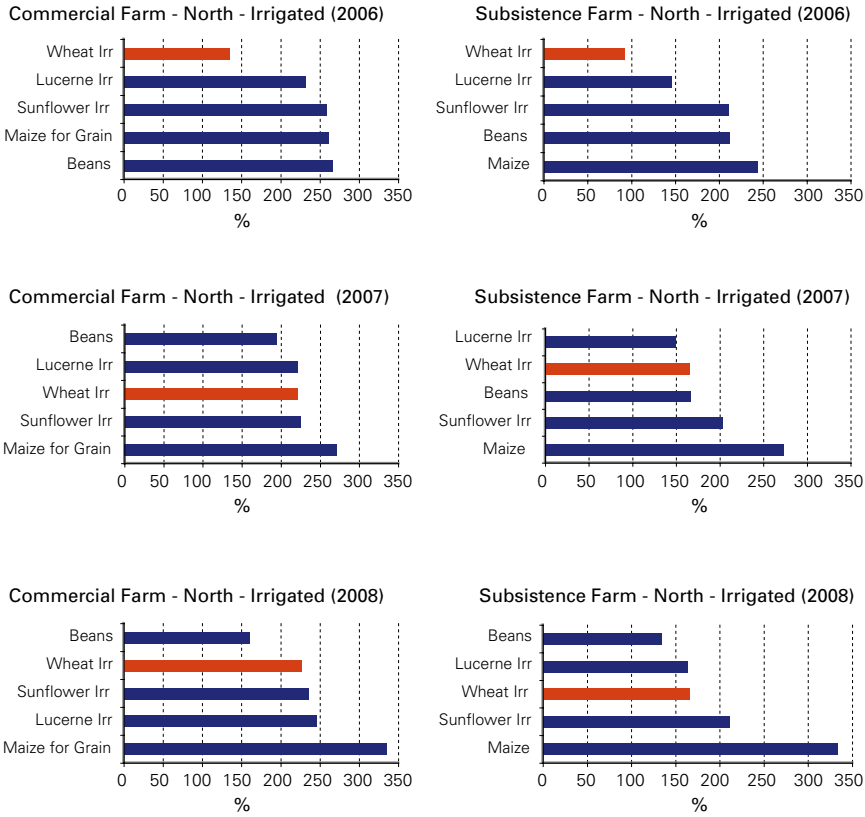
The financial returns[1] on various crops in the Kyrgyz Republic were estimated for 2006, 2007 and 2008. The results are reported in the following tables. The analysis is disaggregated by:

- farm size: subsistence farms (with less than 5 ha of arable land) or commercial farms (with more than 5 ha of arable land);
- region: northern (Chui, Talas, Yssyk-Kul and Narin departments), and southern (Osh, Jalalabad and Batken departments);
- irrigated or rainfed.

Cautionary note on the quality of the estimates. The financial profitability of crops depends on many factors, including local climatic conditions, soil fertility, farm size, access to reliable irrigation, technology such as adequate use of seeds, fertilizers, pesticides (e.g., herbicides), and access to farm equipment (all of whom contribute to production costs and yields, i.e., productivity per hectare). Farmgate prices have an important impact on farm profitability. Estimating the actual production costs and revenues from various crops in a country such as the Kyrgyz Republic – where agro-ecological conditions vary from region to region, there are vast variations of farm size, and statistical data are limited – is a challenge (see the following section on the assumptions that were made). Rather than absolute estimates of returns, the following figures show the variability of returns under various conditions, and compare the evolution of profitability across various crops.

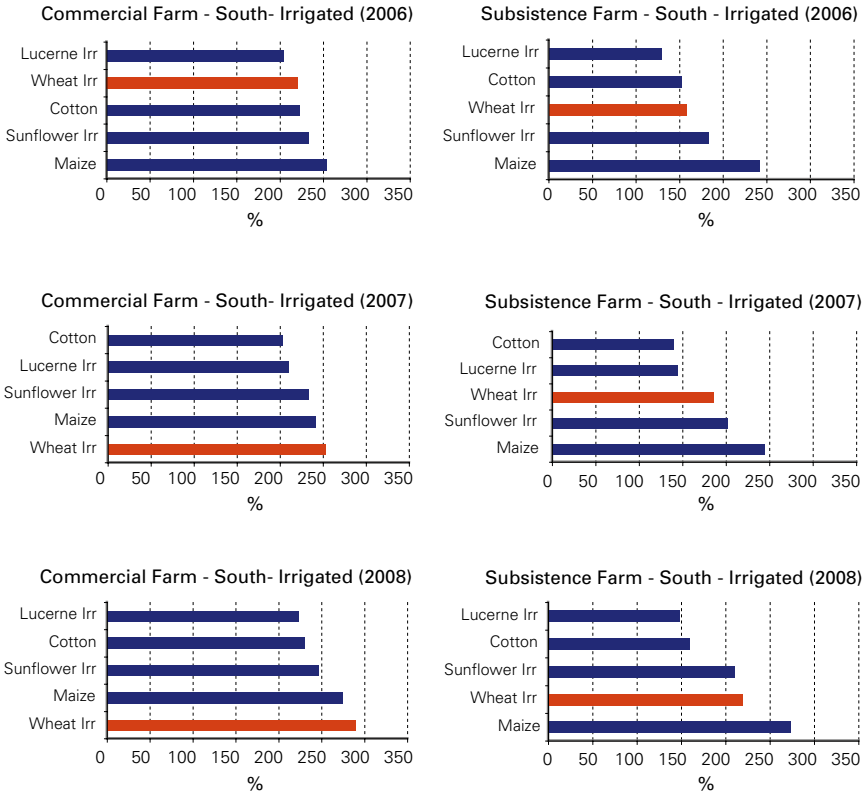
* Based on analyses carried out by Kunduz Masylkanova.
1 Gross of financial costs related to borrowings/credits.

Figure 18
Kyrgyz Republic. Financial profitability of main irrigated crops (north)



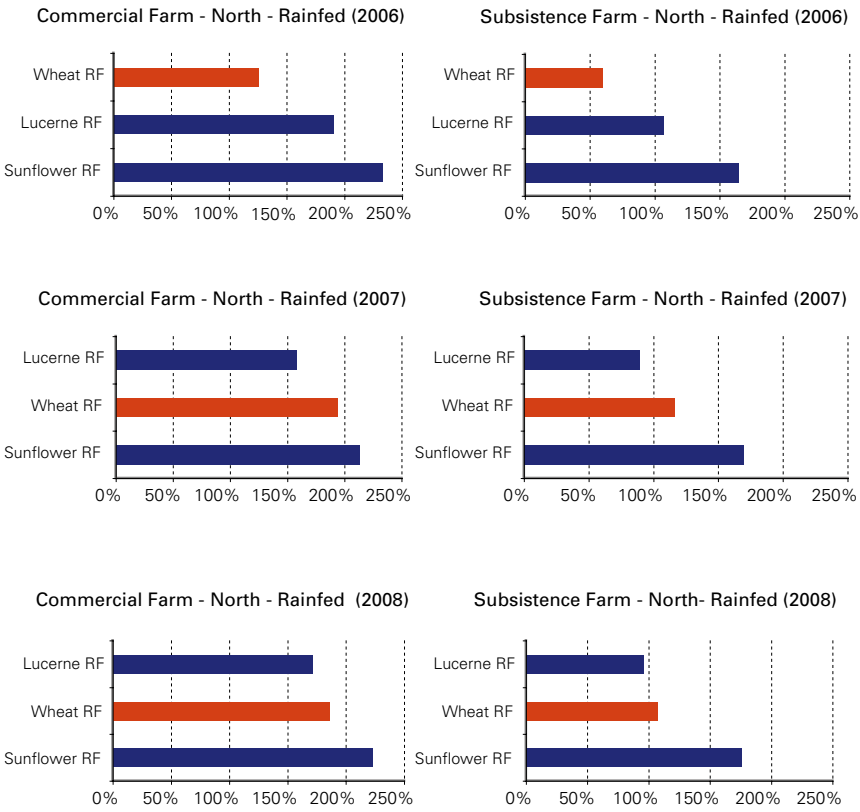
Source: team estimates.

Figure 19
Kyrgyz Republic. Financial profitability of main irrigated crops (south)



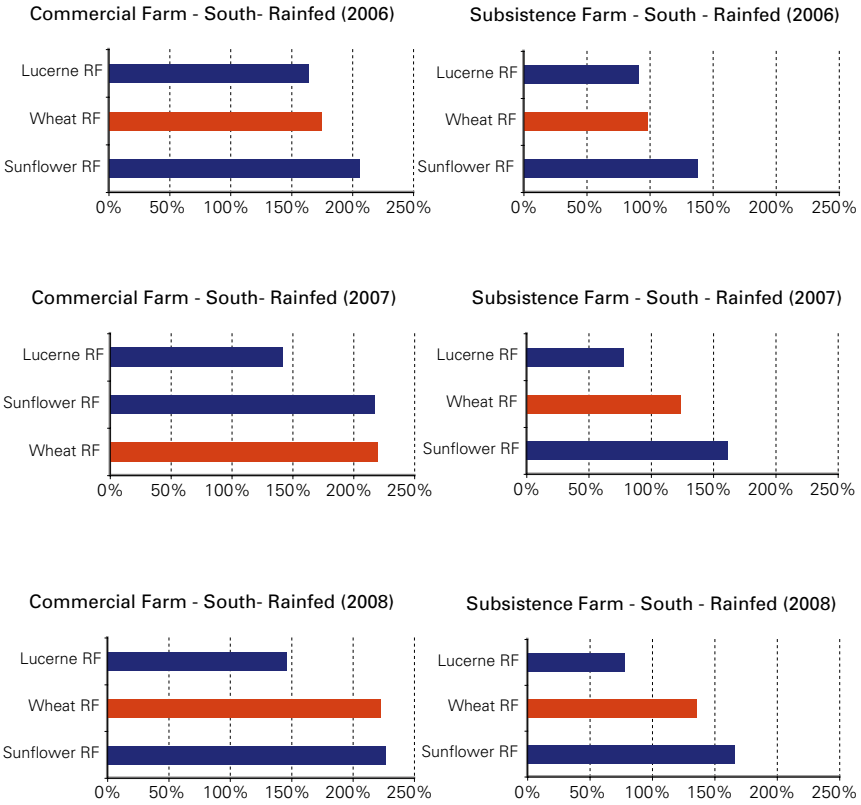
Source: team estimates.

Figure 20
Kyrgyz Republic. Financial profitability of main rainfed crops (north)



Source: team estimates.

Figure 21
Kyrgyz Republic. Financial profitability of main rainfed crops (north)



Source: team estimates.

Assumptions

The estimates in Figures 18 to 21 do not include financial costs related to borrowings/credits.

Wholesale output prices (soms/kg)/[1]

	North			South		
	2006	2007	2008	2006	2007	2008
Wheat[/2]	4	8.4	10.8	5.1	7.1	11.79
Maize	5.5	9.7	13.41	5.8	9	11.25
Rice[/3]				27.7	29.8	37
Potatoes	9.7	9.3	12.08	9.5	9.1	11
Tomatoes[/5]	5	8	12	3.5	5.7	10
Peppers	8.7	14.8	19	6.4	9.3	13
Sugar beet	1.3	1.6	2.08			
Sunflower	9.5	14.7	17.64	11.5	18	21.6
Beans	12	16	20.8	10	14	18
Cotton				16	23	29.9
Tobacco	24	21	27.3	23	30	39
Apples	9.5	12.5	14.5	9.5	12.5	14.5
Apricots	9	12	13.5	9	12	13.5
Lucerne	2.5	4	5.2	2.9	4.6	5.8

Machinery service fees (soms/ha)/[6]

	North			South		
	2006	2007	2008	2006	2007	2008
Ploughing	1 200	1 460	1 786	1 260	1 460	1 786
Cultivation 1	700	910	1 110	735	910	1 110
Cultivation 2	550	715	872	578	715	872
Cultivation 3	450	585	716	473	585	716
Drilling	500	550	660	525	550	660
Fertilizing	350	455	555	368	455	555
Spraying	350	455	555	368	455	555
Harvesting cereals	500	950	1 700	525	950	1 700
Mowing	500	650	793	525	650	793
Bailing	500	800	1 100	525	800	1 100
Transport	0.08	0.10	0.13	0.08	0.10	0.13

Other inputs (soms/kg)

	North			South		
	2006	2007	2008	2006	2007	2008
Fertilizer, nitrate	6.80	12.00	14.00	6.80	12.00	14.00
Chemicals						
for sugar beet	550.00	715.00	893.75	550.00	715.00	929.50
for potatoes	650.00	845.00	1 056.25	650.00	845.00	1 098.50
for cotton	430.00	559.00	698.75	430.00	559.00	726.70
for tobacco	430.00	559.00	698.75	430.00	559.00	726.70
for fruit	240.00	312.00	390.00	240.00	312.00	405.60
for vegetables	470.00	611.00	763.75	470.00	611.00	794.30
Labour (soms/day)[6]	110.00	250.00	280.00	130.00	260.00	285.00

Yield (kg/ha)	North	South
Wheat, irrigated	2 395	2 790
Maize, irrigated	5 100	5 500
Rice, irrigated		2 567
Sunflower, irrigated	2 123	1 570
Sugar beet, irrigated	18 000	
Potatoes, irrigated	14 637	15 063
Beans, irrigated	1 950	1 600
Cotton, irrigated		2 200
Tobacco, irrigated	1 923	1 923
Apricots, irrigated	5 700	6 000
Apples, irrigated	6 800	7 200
Tomatoes, irrigated	14 430	15 957
Peppers, irrigated	14 430	13 957
Wheat, rainfed	1 437	1 674
Sunflower, rainfed	1 273	942
Lucerne hay, irrigated	7 445	5 880
Lucerne hay, rainfed	4 467	3 528

Commercial farmers – economies of scale – machinery	0.65
Commercial farmers – economies of scale – seed	0.80
Commercial farmers – economies of scale – labour, grain	0.40
Commercial farmers – economies of scale – labour, other	0.80
Commercial farmers – economies of scale – fertilizers and chemicals	0.80

Footnotes:

1 The prices used in the model are based on information from KAMIS, NSC and recent World Bank financed projects (AISP, OIP-2), and other sources such as: i) price information collected and used in economic analysis of AISP, OIP-2, SAADP and AADP; ii) information from TES Centre, GTZ, RAS and Helvetas; and iii) information collected from farmers during field trips. Wholesale prices assumed to be equal to 80 percent of average retail prices during harvest period.
2 Wheat prices increased sharply at the end of 2007. The southern area, where farmers grow spring wheat, had lower prices for outputs.
3 The average wheat price for the 2008 harvest season was not known during preparation of the analysis. Therefore, 2008 wheat prices are assumed to be less that those in May and June (information from KAMIS).
4 Prices for locally grown rice (Batken and Osh) are much higher than for imported ones. KAMIS does not specify the origin in its price information.
5 The price of tomatoes in KAMIS is too high. For example, farm survey result in 2006 showed maximum and minimum tomato prices of 10 soms/kg and 0.50 soms/kg respectively.
6 Information on machinery service fees and labour for 2006 and 2007 is from SAADP and OIP-2. Information for 2008 was collected during field trips.

ANNEX 2
Typical agricultural machinery financing modalities

	Modality	Interim ownership
Cash reserves	Money (cash) in a bank account, savings account or as hard cash is used to pay directly for the machine.	Farmer
Bank loan	The farmer buys the machine using money loaned by a bank, usually the bank that handles the farm's normal trading activities. The maximum loan is generally 70% of the new machine cost with the other 30% provided from the farmer's cash reserves, or through selling a used machine either directly to a third party or in part-exchange (trade-in). Repayment of the loan capital and interest is by equal monthly payments, although other payment periods can sometimes be negotiated if the farmer is a good risk, e.g., has a good repayment record. Loan agreements are normally for 3 to 5 years, and a loan arrangement fee is charged when the agreement is signed.	Farmer
Bank overdraft	The withdrawal or spending of money in excess of the amount in the account.	Farmer
Hire purchase	The price of the machine and the down-payment are agreed between the farmer and the supplier. The price includes any discounts and part-exchange allowances. The hire purchase company (finance company) pays the supplier the rest of the purchase price, usually a maximum of 60% of the full retail price of the machine. The farmers repays the balance of the purchase price and interest charges in monthly or annual installments. Customized repayment plans are negotiable, as for bank loans. Normal agreements are for 3 to 5 years. Hire purchase is normally arranged by the machinery dealer/ supplier, who is normally paid a commission by the finance company.	Farmer
Finance lease	The leasing company – usually a specialist machinery finance company – purchase the machine on behalf of the farmer. The farmer signs an agreement to pay leasing charges for an agreed period of 2 to 5 years. The farmer negotiates the price of the machine, including any allowances for a trade-in machinery and discounts, and may also pay a deposit or down-payment for part of the cost. The outstanding balance of the machine price is used to calculate the leasing charges.	Leasing company
Contract hire	The machine is hired or leased to the farmer by a specialist machinery hire company for up to 5 years; the normal period is 3 years. This method is generally used only for self-propelled machines, e.g., tractors, harvesters, sprayers and forklifts. Contract hire covers all machine costs, apart from fuel, regular maintenance and labour, typically over a 3-year period. This modality is used increasingly for large machines that are not needed on the farm for the whole year.	Machinery supply company
Operating lease	Differs from contract hire in that the farmer carries out all repairs, agreements are usually longer, and the machine is not hired to any other farmer during the contract period.	Machinery supply company

	Final ownership	Principal advantage	Principal disadvantage	Taxation
Cash reserves	Farmer	Lower interest charges	Lack of cash for short-term business needs	Depreciation of machine value allowed against taxable profits
Bank loan	Farmer	Lower interest charges with some rural banks	Collateral needed for loan security	Depreciation of machine value allowed against taxable profits
Bank overdraft	Farmer	Short-term loans	Bank has control of the debt and can demand payment without notice	Depreciation of machine value allowed against taxable profits
Hire purchase	Farmer	Collateral is owned by finance company	None	Depreciation of machine value allowed against taxable profits
Finance lease	Third party	Collateral not needed by farmer	Not economic for machines kept for more than 5 years	Finance charges fully offset against profits before taxation
Contract hire	Machinery supply company	Seasonal machines, specialized machines, no assets to dispose of	Most expensive for machines needed on the farm all year	Hire charges fully offset against profits before taxation
Operating lease	Machinery supply company	Cheaper than contract hire for long-term leases	Requires proven good maintenance record by farmer	Hire charges fully offset against profits before taxation

Source: FAO, AGSE.

ANNEX 3
Examples of websites on second-hand agricultural machinery

http://agrikontor.com/
www.traktorshop.de/
www.landtechnik-veit.de/gebrauchtmaschinen.html
www3.traktorpool.de/informationen/agb.php
www.lebensmittelwelt.de/gebrauchtmaschinen.html
www.agropool.ch/
www.europe-machinery.com/
www.landmaschinenboerse.de/en/start_en.htm
www.mascus.de/agriculture/used-tractors
www.maskinbladet.dk/
www.fricke.de/opencms/en/index.html
www.agrar-marktplatz.de/mdb/
www.agriaffaires.de/
http://agrobox.de/landtechnik/traktoren/
www.annonces-agricoles.com/
www.bau-center.com/
http://www.cornishtractors.co.uk
www.xportag.com
www.used.farmmachinery.com
www.agregister.co.uk/product-309000.html
www.equipmentlocator.com/italia/ag-fp/elsfarmequipment.htm
www.browfarm.co.uk/machinery/machinery_index.htm
www.bellevuetrading.com.au/company.htm
www.enriquesegura.com/vista/index.php/en/empresa

ANNEX 4
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