

Rural non-farm activities in Central Asia: a regional analysis of magnitude, structure, evolution and drivers in the Kyrgyz Republic

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Abstract

This paper provides an in-depth regional analysis of the rural nonfarm sector (RNFE) in Kyrgyzstan based on three household budget surveys for 2003, 2005 and 2006. The main finding is that the RNFE had predominantly “push” nature in spite of all reforms in the agricultural sector. Regression results demonstrate that the magnitude of private rural nonfarm employment was larger in districts with low agricultural potential measured by size of land per capita and land quality, indicating its “push” nature. Only in land-rich districts with extremely favourable agricultural conditions and low population pressure or in areas close to resorts, non-farm employment can be attributed to “pull” factors.

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1. Introduction

After almost three decades of economic reforms, more than half of the population of the three poorest transition countries in Central Asia –Tajikistan, Uzbekistan and Kyrgyzstan– still lives in rural areas with high population pressure and widespread poverty and unemployment. Following the collapse of the Soviet Union, both industrial and agricultural production dwindled. Access to the large market of the former Soviet Union was inhibited, existing organizations were broken down, and new economic structures had to be developed. Several studies have analysed the nature and consequences of the associated agricultural reforms (for example, Rozelle and Swinnen, 2004; Lerman, 2007, Lerman and Sedic, 2009). Yet, there is an almost complete lack of empirical evidence on the development of the rural nonfarm economy (RNFE) and its drivers in the context of post-Soviet Central Asia.

Developing agriculture is not sufficient to address income disparities and to transform countries (Davis and Bezemer, 2003; World Bank, 2007). Also development of industry and services is required to generate income and provide employment, not only in cities but also in rural areas. The rural non-farm economy (RNFE) has a potential to absorb surplus rural labour, to overcome seasonal income variability of agricultural activities, and to provide income in case of droughts and the loss of livestock (Bright et al., 2000; Lanjouw and Lanjouw, 2001; Ellis, 2004; Haggblade et al., 2007). This makes it important for rural households and especially for the poor and vulnerable in the context of imperfect insurance, credit markets, and weak safety nets (Barrett et al., 2001).

In order to develop efficient policies to stimulate rural economic growth, policymakers need insight in the nature and drivers of the RNFE (Reardon et al., 2006). If participation in the non-farm sector is driven by new opportunities and high pay-offs, policies need to aim at helping the poor to overcome existing entry barriers through for example credit programs, marketing assistance, or training. If, on the other hand, people participate in the nonfarm sector due to lack of opportunities in farming, nonfarm policies should have a more general focus on the development of the nonfarm economy through increasing general access to markets, competitiveness with industrial products, and the development of knowledge and skills.

The main aim of this paper is to analyze recent developments in the RNFE and its drivers in Central Asia. We employ three household budget surveys from the Kyrgyz Republic for 2003, 2005 and 2006, which provide accurate representative information on both rural nonfarm employment and rural nonfarm income. Kyrgyzstan is a very interesting case to explore. It has substantial variation in regional development and agro-climatic conditions, resulting in substantial regional differences in the RNFE. It is a poor and predominantly rural country and the most advanced agricultural reformer in the region. 65% of the population resides in rural areas, and agriculture generates 30% of GDP. The obtained results provide valuable information for policymakers in Kyrgyzstan and in other countries in the region.

The layout of this paper is as follows. The second section is devoted to conceptual framework. The third section describes briefly the country context after the break-up of the Soviet Union. The magnitude and structure of the RNFE at regional level for 2003, 2005 and 2006 are presented in the fourth section. The empirical model is specified and estimated in the fifth part of the paper, followed by the discussion of the main results. Section six concludes.

2. Conceptual framework

2.1 Concepts and definitions

Two conceptual issues should be clarified before the analysis of the RNFE. Firstly, what is a rural area? Secondly, what does non-farm mean? The answers mainly depend on the research questions and the data availability. For the first question different criteria can be used. OECD, for instance, considers a community with the population density below 150 inhabitants per km² as rural (OECD, 2006). A threshold of 5000 inhabitants per settlement is often used in the non-farm literature (Barrett and Reardon, 2000). In some countries a division is made according to municipal and government functions, while in others everything outside the main large cities is considered as rural areas (Saith, 1992). In this paper, the data have a predetermined administrative division into urban and rural areas, where rural areas cover localities with population not less than 50 and not more than 2000 inhabitants.

There is a lot of confusion in the literature about the definition of non-farm economic activities as well. Several authors describe and discuss these issues in details (see, for example, Barrett and Reardon, 2000; Davis and Bezemer, 2003). Barrett and Reardon (2000) advocate a distinction between non-farm and farm activities based on the sectoral division between primary versus secondary and tertiary sectors as commonly used in national accounts. Using this approach, farm activities include primary agricultural activities, forestry and fishing aimed at producing raw products with natural resources as production factors. The process can involve either “growing” (cropping, livestock) or “gathering” (hunting, fishing, etc). Non-farm activities, in contrast, include all other income generating activities in secondary (manufactured goods) and tertiary (services) sectors. Primary non-agricultural activities as mining are also included into nonfarm activities. Importantly, this sectoral separation does not take into account the spatial perspective, technologies used and type of income (wage, profit, etc.).

In this work, similar approach is taken, and all economic activities in rural areas except primary agriculture, livestock, fishing and hunting are considered as part of the RNFE, however we do not include nonfarm activities undertaken abroad by internal and external migrants. We are more interested in local development of the RNFE as potential alternative to widespread labour migration. Therefore, migrants are excluded from the analysis and information on employment covers only locally employed rural inhabitants.

Income from nonfarm activities includes income from processing of raw crops and animal products at the household irrespectively whether processed products are consumed at home or sold. We also distinguish two types of nonfarm activities: public nonfarm employment, including education, public administration, health and social services; and private employment, which covers all other nonfarm sectors.

The magnitude of the RNFE can be measured by three commonly used methods. The first estimates the mean share of non-farm income in total household income (Davis et al., 2007). Problems usually come with the accurate measurement of income, which can vary from season to season, may include consumption of own products and be in-kind. The other way to measure the magnitude of the RNFE is to estimate the share of people employed in non-farm activities. It is important to control both for primary and secondary employment in this indicator in order to present the full picture. The third method estimates the share of time in nonfarm activities to total time worked which better captures intensity of nonfarm activities in comparison to only employment data. In this study we use all three methods to have wider and more accurate picture.

2.2 Determinants of non-farm activities at the regional level

Determinants of non-farm activities at the household level are often conceptualised as incentives and capacity variables (Reardon et al., 2006). Capacity variables determine the access of households to non-farm activities given levels of incentives and the type of non-farm activities. The relative prices of inputs and outputs, along with their relative instability/riskiness, act as incentives.

Incentives at the micro level are mirrored at the meso level. One of the main factors influencing incentives is the development of agriculture. According to dynamic linkages models, growing agriculture acts a motor of growth for non-farm activities through production and consumption linkages (Anderson and Leiserson, 1980; Haggblade and Hazell, 1989; Balisacan, 1991; Mellor 1995). A growing farm sector implies an increase in the demand for inputs and services and the resulting higher incomes result in higher demand of nonfarm consumer goods. This may stimulate the local nonfarm sector, which in turn may pull people out of agriculture.

Agriculture is not the only potential growth “motor” for the RNFE. Tourism or mining can also be sources of development of non-farm activities (Reardon et al., 2001). Proximity to urban centres can open new opportunities for rural non-farm activities as well, but it can also expose rural producers to new threats like quality requirements and more competitive environment (Islam, 1997).

The logic of the development of agriculture works in the opposite direction, when non-farm activities develop in stagnant rural areas with lack of arable land, water, and risky weather conditions. In the presence of incomplete credit and insurance markets, farmers are often pushed into non-farming in these areas due to low agricultural productivity and low purchasing power. These activities are often labour-intensive with low-returns (Ellis and Allison, 2004; Haggblade et al., 2007). The “push” scenario may also happen in very remote areas without infrastructure, where physical access to markets is so costly that household should do some non-farming activities to satisfy their needs in some products and services (Barrett et al., 2001).

Incentives are not the only factors shaping the RNFE. Capacity variables also drive and constrain non-farm activities. Imperfect credit markets may explain why a farmer needs to do non-farming to earn cash to invest in his farm, but at the same time they may inhibit diversification into non-farm activities with high capital requirements. Imperfect land market and inability to use land as collateral may lead to similar problems. Therefore, in resource-poor regions, where there are many incentives to start non-farm activities, there is often no supportive capacity to do so at the meso level (Reardon et al., 2006).

3. Country context

Kyrgyzstan is a former Soviet Union Republic located in Central Asia and bordering Uzbekistan, Tajikistan, Kazakhstan and China. It is a small mountainous landlocked country with predominantly rural population around 5.2 mln people (65% live in rural areas). Kyrgyzstan is a low-income country with a GNI per capita in 2007 of USD590 (World Bank, 2008). The country is divided into 7 provinces (Chui, Issykkul, Naryn, Talas, Jalalabat, Batken and Osh) and two cities with the same status: Bishkek (capital) and Osh. Each comprises districts/rayons, which are administrative regions including cities, urban-type communities and villages. There are 40 rayons in total in the Republic. The size of rayons differs substantially across the provinces (from 100 thousand people in the South to 20 thousand in the North).

The territory of Kyrgyzstan is 19995 thousand hectares (ha). By January 2008, 9188 thousand ha were under pastures and only 1344.9 thousand ha (6.4%) under arable crops with 915.8 thousand ha irrigated. About 10% of arable land was not used due to salinisation, lack of machinery, seeds, remoteness etc. in 2006¹. Regional differences in farm size are substantial. As shown in figure 2, the largest agricultural areas per capita are in the Northern part of the Republic (Chui, Issykkul, Naryn and Talas); while in the South (Osh, Batken and Jalalabat) agricultural land per capita is much smaller due to higher population pressure.

¹ State Agency for Property Rights Registration under the Government of the Kyrgyz Republic, available at: http://www.gosreg.kg/gosreg_ru/index.php?option=com_content&task=view&id=178&Itemid=179, accessed 10 March, 2010.

Landscape and climatic conditions differ significantly across the provinces. Parts of Osh, Jalalabat and Batken province are located in the Fergana valley with a warm and dry climate, while Naryn, Talas, and Issykkul are mostly mountainous areas with a climate ranging from temperate in the foothills to dry continental and polar climate in the Tian Shan range. The vegetation is classified into three belts: settled agriculture below 1500, grasslands and scrub between 1500 and 3000 meters, and last highest belt comprises alpine grassland and sub-alpine meadows above 3000 meters (Fitzherbert, 2000).

Figure 1. Administrative map of the Kyrgyz Republic



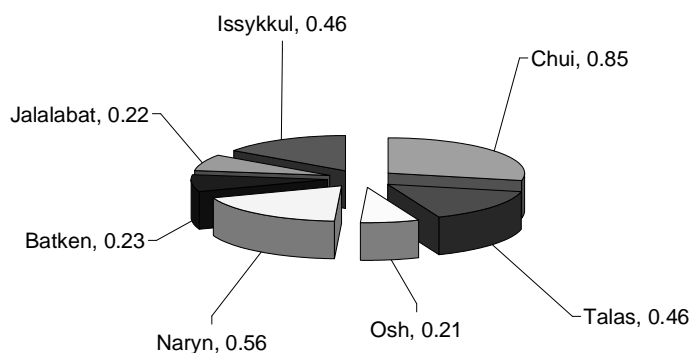
Source: <http://www.lib.utexas.edu/maps/kyrgyzstan.html>

After the break up of the Soviet Union in 1991, Kyrgyzstan faced a severe economic downturn involving hyperinflation, high unemployment, and a decline in real incomes leading to a dramatic increase in poverty (61.8% of the total population in rural areas and 45,7% urban areas in 2002). GDP declined to 50% of the 1990 level between 1991 and 1995. Since 1993 many economic reforms have been implemented, and the country started recovering after 1996. Currently, the country has the most open and liberalised economic regime of the region. Kyrgyzstan made substantial reforms in the agricultural sector and is considered an advanced reformer according to ECA agricultural policy index². In spite of all positive achievements, poverty reduction, diversification of the economy, improvement of the business climate and strengthening of governance are still high on the agenda (World Bank, 2009).

The structure of the economy has changed in comparison to the first years of independence. The share of industrial output declined from 39% of GDP in 1992 to 19.6% in 2007. The share of services, in contrast, increased substantially from 23.2% in 1992 to 48.4% in 2006. The share of agricultural sector in GDP has not changed much and is still about 30% of GDP (Asian Development Bank, 2009). Growth in the agricultural sector was the engine behind the economic growth in Kyrgyzstan in the second part of 1990s and early liberalization and land reform were the main factors behind the increase in agricultural output during 1995-2001.

² ECA agricultural policy reform index consists of five components, measuring progress with land reform, liberalization of agricultural markets, privatization, institutional framework and rural finance. It is constructed on the scale from 1 to 10, where 10 mean an economy with completed market reforms. Index for Kyrgyzstan was 7.4 in 2004 making it advanced reformer among Former Soviet Union countries (Lerman, 2007).

Figure 2. Average size of agricultural land per capita in 2007 by province, ha



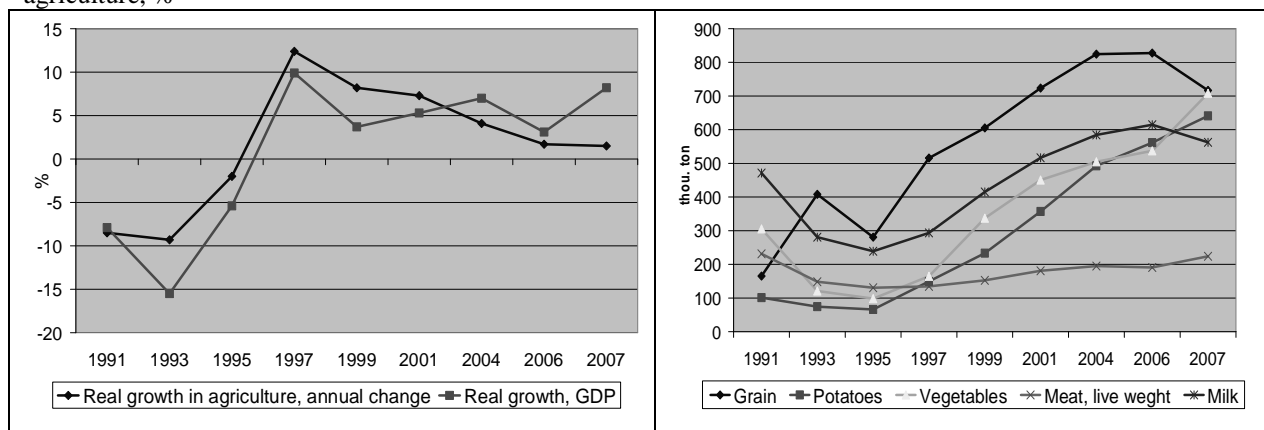
Source: NSC cited in USAID (2008)

The land reform took place in 1994 and 1995 and involved distribution of state land to individual households. It resulted in farm sizes ranging from 0.1 ha/person to 1 ha/person, with the smallest farms concentrated in the more densely populated southern provinces (Akramov and Omuraliev, 2009). Because of the land reform, the number of small private farmers increased enormously. According to Akramov and Omuraliev (2009), there were 924 thousand family farms with on average 0.11 ha of land (producing mainly for subsistence and selling surpluses in the market), 323.6 thousand peasant farms with on average 2.9 ha of arable land (middle sized family farms dealing with commercial farming), and 1.3 thou. corporate farms with on average 58.9 ha of arable land in 2007 (successors of agricultural enterprises). In spite of the lowest share in total sown area (9%) and small size, family farms were responsible for 37% of total agricultural output and had the highest value of agricultural output per hectare (325.4 thousand som). In comparison, peasant farms comprised 84.3% of sown area, but accounted for only 60% of agricultural output, and had substantially lower agricultural output value per hectare (56 thousand som). Corporate farms had even more modest agricultural output per hectare (31.9 thousand som). This indicates the leading role of individual farms in the increased production and productivity of agriculture. According to World Bank (2007), private farmers were also main owners of cattle and sheep (96%), horses (97%) and poultry (85%), while livestock contributed 44% of agriculture sector output and 50% of agricultural growth from 1992-2004.

Figure 3 presents the volume of traded agricultural products and the real growth rate of GDP and agriculture. Sale of agricultural products started growing after 1994-1995 coinciding with the land reform. The average real growth rate in agriculture was about 9% during 1996-2000. This increase in output was mainly due to intensified farming, higher producer prices on cattle and a switch to high value crops by individual farmers that replaced former collective state farms.

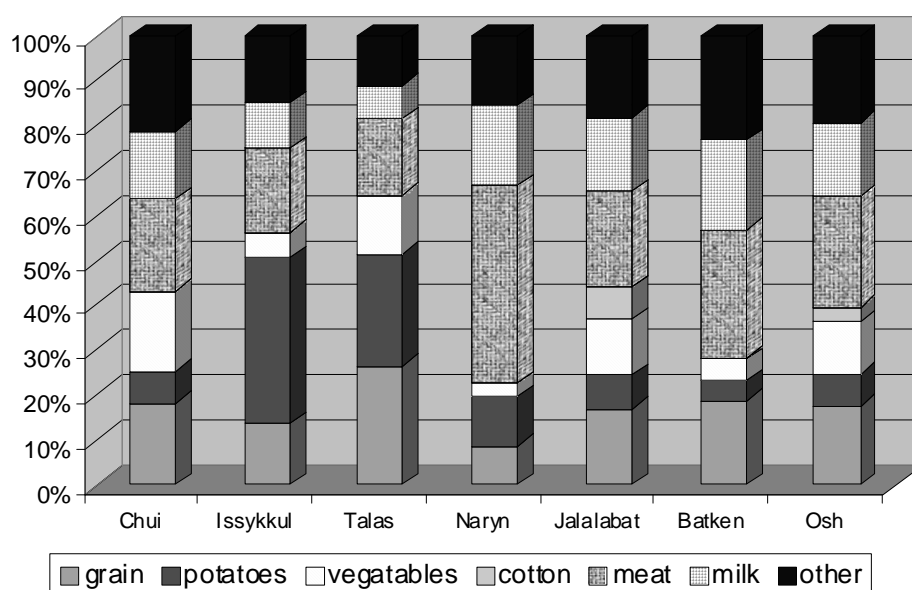
There are differences in the development and structure of agriculture between provinces due to different agro-climatic conditions. Chui, Osh, Jalalabat and Issykkul are the regions accounting for 27%, 19%, 16% and 15% in total value of agricultural output in 2007. The remaining 23% are distributed among Talas, Naryn and Batken province. Crop cultivation plays more important role in Talas and Issykkul province, where grain and potatoes have significant shares. Livestock is more important in Naryn province. Crop cultivation and cattle breeding play almost equal roles in other provinces.

Figure 3. Realization of main agricultural products in the Kyrgyz Republic, thou. ton and real growth of GDP and agriculture, %



Source: NSC and ADB

Figure 4. Structure of agricultural output by provinces, %



Source: National Statistical Committee, authors' calculation

In spite of the fast development in agricultural sector, after 2002 the growth slowed down. This happened mainly due to the low labour productivity which required better planting technology or higher capital stock. However, access to credit and lack of investment are still the main constraining factors behind sustained growth in agriculture, making it a safety net rather than a profitable industry. A more detailed review of the above issues is presented in Light (2007), Dall'Olio (2008), and Demiri (2008).

4. The RNFE in Kyrgyzstan

4.1 Data description

The data used for the research is part of three representative household budget surveys (HBS), conducted by the National Statistical Committee (NSC) of the Kyrgyz Republic in 2003, 2005, and 2006. Only rural households are taken for the analysis, which gives about 1800 observations for each year. In order to identify meso-factors which influence the magnitude of the RNFE in Kyrgyzstan, the data was aggregated and pooled. Since aggregation at the provincial level does not give us sufficient degrees of freedom to do multiple regression analysis, the analysis is done one level lower at the rayon level. The numbers of observations and rayons for each province are presented in table 1.

The surveys cover a broad range of information about the occupation of household members older than 15 years at a quarterly basis. An individual is considered as employed if he or she was engaged in income generating activity for at least one hour a week. Individuals are asked about their primary, secondary and tertiary employment. Tertiary employment mostly covers residual activities at the household: producing and processing agricultural products and providing services.

Detailed income data was only collected in 2005 and 2006. Total income of the household consists of the following items: farm income, income from salary or self employment from the primary employment, additional income from secondary and tertiary employment, salary paid in kind, stipends, aliments, social benefits, net transfers, interests and dividends. More detailed description of income construction is presented in the annex.

Table 1. The number of observations and the number of rayons by provinces in 2005-2006, without weights

Provinces	Number of observation, households		Number of rayons
	2005	2006	2005/2006
Issykkul	255	261	5
Jalalabat	236	241	8
Naryn	234	260	5
Batken	233	237	3
Osh	242	251	7
Talas	262	264	4
Chui	382	374	8
Republic	1844	1888	40

Source: HBS 2005, 2006

4.2 Magnitude, structure and dynamics of the RNFE during 2003, 2005 and 2006

As shown in table 2, the share of labour employed in the nonfarm sector as a primary activity to total rural employment expanded from 34.3% in 2003 to 39.6% in 2006. The same tendency demonstrates the share of hours in nonfarm activities to the total hours worked. It increased from 38% in 2003 to 50% in 2006. The highest shares of time in nonfarm activities were observed in Chui province and the southern provinces: Osh, Batken and Jalalabat. It is important to mention that the growth in the magnitude of nonfarm activities was driven not only by expansion of the RNFE, but also because of shrinking of farm employment due to accelerating internal and external migration. Even though the survey is not designed to measure labour migration there was still an increase in the share of internal and external migrants to the total number employed from 5% in 2003 to 11% in 2006.

Table 2. Share of rural households employed in nonfarm activities to total employed population and share of time in nonfarm activities to total time worked, %

	2003	2005	2006
Share of nonfarm employment			
Main employment	34.3%	37.8%	39.6%
Secondary employment	1.7%	2.7%	2.2%
Tertiary employment	0.3%	0.2%	0.1%
Share of time in nonfarm activities to total time worked			
Republic, rural	38%	47%	50%
Issykkul	30%	35%	34%
Jalalabat	33%	42%	49%
Naryn	23%	27%	38%
Batken	49%	44%	51%
Osh oblast	39%	50%	54%
Talas	23%	29%	29%
Chui	52%	63%	61%

Source: NSC and authors' estimation.

The structural distribution of non-farm employments shows that in 2003 only 57% of primary employment in the RNFE was generated in private sectors. The most important private sectors in 2003 were trade (19%), processing (9%), and transport and communications (9%). Education played the leading role with 23% in total non-farm employment among public non-farm sectors. The distribution of non-farm employment has slightly changed since 2003. The role of private non-farm sectors increased, mainly due to larger employment in processing, construction and transport sectors. Employment in public sectors in contrast declined from 43% in 2003 to 36% of total rural employment in the RNFE in 2006. Secondary employment and tertiary employment mostly consisted of processing, construction and trade activities.

Table 3. Sectoral distribution of the RNFE employment, %

	Primary employment			Secondary employment			Third employment		
	2003	2005	2006	2003	2005	2006	2003	2005	2006
Private RNFE, including	57%	60%	64%	92%	96%	95%	100%	100%	100%
Mining	0%	1%	1%	1%	1%	0%	0%	0%	0%
Processing	9%	11%	13%	10%	3%	7%	24%	45%	72%
Production and distribution of gas, water and electricity	3%	3%	3%	0%	0%	1%	0%	0%	0%
Construction	8%	9%	10%	30%	41%	21%	8%	0%	0%
Trade, repair of cars	19%	19%	18%	28%	26%	29%	47%	55%	22%
Hotel and restaurant businesses	2%	4%	3%	1%	1%	0%	0%	0%	0%
Transport and communication	9%	10%	11%	17%	18%	29%	0%	0%	6%
Financial activities	1%	0%	0%	0%	0%	0%	0%	0%	0%
Real estate	2%	1%	1%	0%	1%	0%	1%	0%	0%
Municipal, individual services	3%	2%	2%	2%	3%	5%	20%	0%	0%
Services on housekeeping	1%	1%	1%	4%	3%	2%	0%	0%	0%
Public RNFE, including	43%	40%	36%	8%	4%	5%	0%	0%	0%
Public administration	10%	10%	9%	3%	2%	0%	0%	0%	0%
Education	23%	20%	19%	4%	1%	3%	0%	0%	0%
Health and social services	9%	9%	8%	1%	1%	1%	0%	0%	0%
Total non-farm, %	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: NSC, authors' estimation

The intensity of non-farm activities is measured by the average hours of work that an individual was employed during a week. The data is presented at quarterly basis to see seasonal variation in the intensity of the RNFE. There is significant difference between the intensity of primary and secondary employment in non-farm sector. Employment in the RNFE as a primary employment provides a full workload with 8 hours per day (5 working days in a week), while, in contrast, primary farm employment shows underemployment and substantial seasonal variation. Secondary employment in the RNFE did not generate full workload during the week and followed seasonal pattern of agriculture, at least in 2003 and 2005 years. This limits possibility of secondary employment to smooth labour supply in lean agricultural seasons.

Table 4. Mean weakly hours of workload in farm and non-farm sectors, primary and secondary occupations

	Mean weekly hours of work, primary employment						Mean weekly hours of work, secondary employment					
	2003		2005		2006		2003		2005		2006	
	F	NF	F	NF	F	NF	F	NF	F	NF	F	NF
Year	27	39	21	38	19	38	18	23	14	27	15	28
I	20	38	14	38	9	37	17	15	15	25	15	29
II	34	40	28	38	25	38	18	23	14	28	15	26

	Mean weekly hours of work, primary employment						Mean weekly hours of work, secondary employment					
	2003		2005		2006		2003		2005		2006	
	F	NF	F	NF	F	NF	F	NF	F	NF	F	NF
III	33	40	27	39	26	38	18	25	14	27	14	30
IV	15	40	11	38	15	38	19	29	13	28	14	25

Source: NSC, authors' calculation.

The dichotomy between primary and secondary employment in the RNFE is also visible in functional structure of time worked in nonfarm sectors (table 5). Large part of main employment in the RNFE is formal employment in enterprises, organisations etc, while secondary employment is mainly self-employment or working for private individuals.

Table 5. Functional structure of the time worked in nonfarm activities, %

Type of employment	2003		2005		2006	
	Main	Secondary	Main	Secondary	Main	Secondary
On enterprise, organization, cooperative, etc.	57%	9%	54%	4%	50%	8%
On individual basis	26%	62%	27%	51%	27%	55%
Hired by private individuals	17%	29%	18%	44%	23%	37%
Other	0%	1%	1%	1%	1%	0%
Total	100%	100%	100%	100%	100%	100%

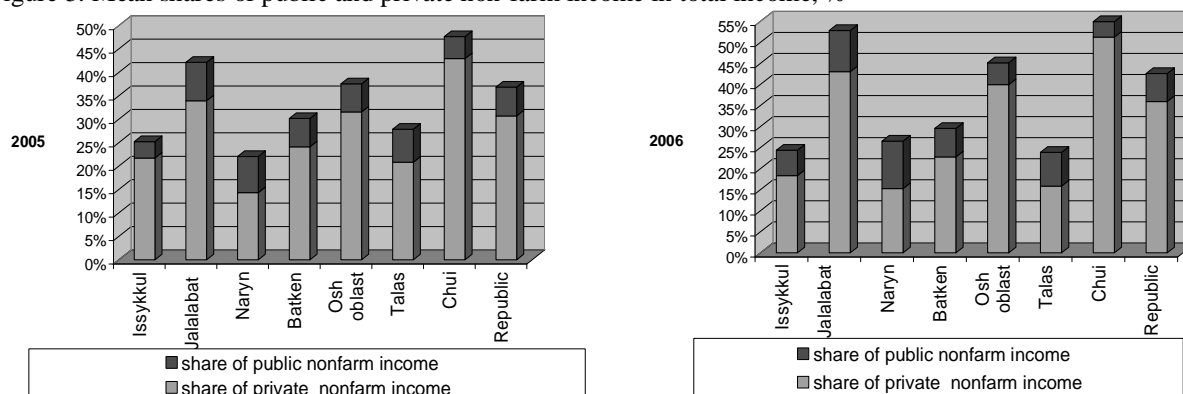
Source: NSC, authors' calculation.

The share of non-farm income in the total income of household is another widely used indicator to measure the magnitude and intensity of the RNFE both at household and more aggregated levels. In this paper, the share of non-farm income was estimated at the household level and then aggregated using mean shares for provinces and for the whole republic. We separated income from public nonfarm employment to have better picture about nonfarm income from private sectors. As mentioned, the data allowed estimating income aggregates only for two years: 2005 and 2006.

Figure 5 presents the provincial structure of public and private non-farm income shares. Total shares of non-farm income followed the employment pattern and demonstrated the same positive dynamic (increase from 37% in 2005 to 43% in 2006). The regions with the highest shares of non-farm income were Chui, Osh and Jalalabat. Non-farm income shares increased in each of these regions in 2006 in comparison to 2005. The lowest shares of non-farm income were observed in the Northern provinces of the Republic: Issykkul, Naryn and Talas. Income from public nonfarm employment generated about 6% of total income in 2005 and 7% in 2006.

It is interesting that the share of public nonfarm income is lower than the share of hours worked in public nonfarm employment. For instance, in 2005 the share of time worked in public nonfarm sectors to total time worked in the RNFE was 32%, but the share of nonfarm public income in total nonfarm income was only 17%. This can be explained by lower salaries in public sector in comparison to private one. If we compare the mean size of salary in private and public RNFE, we find out that rural public nonfarm salary was 38% lower than the private one. This can explain why public employment generates lower income relative to hours worked in comparison to private nonfarm income.

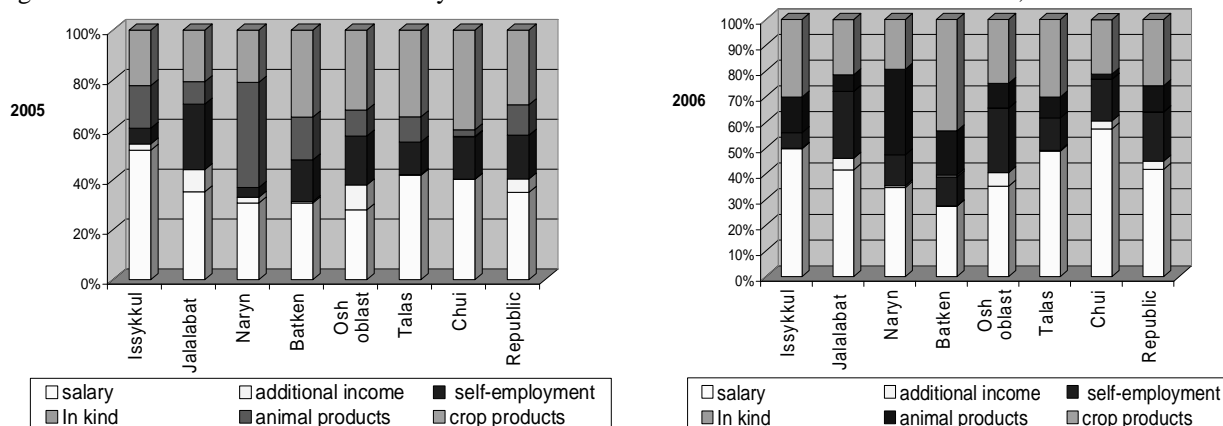
Figure 5. Mean shares of public and private non-farm income in total income, %



Source: NSC, authors' calculation

Breaking non-farm income shares by functional classification of source of income also presents interesting information (figure 6). Most primary nonfarm income was in the form of salaries: 34% and 42% in total non-farm income in 2005 and 2006 respectively. The highest shares of non-farm income from salary were observed in Chui, Talas and Issykkul provinces. Income from crop products represented the second largest source of total non-farm income, accounting for 30% and 26% in 2005 and 2006 accordingly. Leaders in this source of non-farm income were Batken and Talas. Share of nonfarm income from self-employment was in the third place, increasing from 18% in 2005 to 19% in 2006. Income from processed animal products did not play an important role except for Naryn province (traditionally dealing with cattle breeding), where it accounted for 42% in 2005 and 33% in 2006. In sum, there was a tendency of a decreasing role of non-farm income from crop and animal products and increasing role of non-farm income from salaries and self-employment.

Figure 6. Structure of non-farm income by functional classification of income in 2005 and 2006, %



Source: NSC, authors' calculation.

Note: additional income includes income from secondary and tertiary employment in nonfarm activities and is not disaggregated. Animal products and crop products measure share of income from processed raw agricultural products at the household.

Summing up, non-farm activities play an important role in the Kyrgyz Republic. Both the magnitude and intensity of non-farm activities expanded during the considered years. Income from salary, self-employment, and crop products were the most important sources of non-farm income and the role of first two was increasing with time. Non-farm employment and non-farm income were most prominent in southern provinces and Chui province in the North.

5. RNFE determinants at the rayon level

5.1 Model specification

We use a simple empirical model to explain the magnitude of the RNFE in different rayons of the Kyrgyz Republic. The dependent variable is percentage of time in nonfarm activities (primary, secondary and tertiary occupations) to total time worked at the rayon level. Following the theoretical overview of the determinants of RNFE development, the independent variables represent factors that affect the incentives and capacity of the rural population to engage in the RNFE and, as a result, shape the magnitude of private nonfarm activities at the rayon level. To check robustness, we ran separate regressions for percentage of time in private and public nonfarm activities. The discussion of the results will focus on the regression for employment in the private RNFE, since the private sector is the main employer in the country and shaped mostly by private decisions with only indirect influence of government policy.

Agricultural development is one of the most important factors from the incentive side. Its impact on the magnitude of the RNFE can be twofold. Nonfarm employment can be substantial in depressed regions due to the inability of agriculture to provide income for sustainable living or its instability and riskiness (“push” scenario). However, developed commercial farming can also stimulate profitable nonfarm activities through different forward and backward linkages (“pull” scenario).

We employ two indicators to measure agricultural potential in the rayon. The first covers the average size of total land per capita and its squared term. Total land size includes arable land, fallow land, perennials and hayfield. Unfortunately, we do not have information on the size of pasture at rayon level which is a public property. We hypothesize that in areas with limited availability of land, RNFE employment will be high because households are pushed to the RNFE, while in rayons with ample land, agricultural development may stimulate non-farm activities, which pull households to the RNFE. Therefore, we expect a U-shaped relationship between total land per capita and share of workload in the RNFE at rayon level. For better accuracy we decided to take information on land size from the State Register of the Kyrgyz Republic instead of the survey. There is no rayon-level information on land for 2005 and 2006. We therefore took total land by the end of 2008 and divided it by the size of the rural population in 2005 and 2006 to get arable land per capita.

The second variable measures the quality of land and its harvesting capacity. For this purpose we employ basic rates for land tax. The government of the Kyrgyz Republic establishes basic rates for land tax dependent on the fertility and location of land³. We hypothesize that the size of land and the quality of land may compliment each other and determine the development of agriculture in the rayons, which, in turn, affects the magnitude of the RNFE. Since basic rates are different for different type of land, we constructed a simple mean of tax rate for arable, fallow, perennial and hayfield land.

From the incentive side, the RNFE can also be stimulated by other local “engines” of growth, such as recreational and natural resources that can create non-farm employment opportunities. The presence of towns in the neighbourhood can also be important for the RNFE. They may serve as a market for produced manufactured goods in rural areas or just provide more attractive employment opportunities. To control for local engines of growth, we introduce a dummy for the rayon where famous resort area Issyk-Kul is located. In addition, we include dummy for the presence of cities in rayons. Since many cities are very small and located in remote areas, distance from them to the provincial capital is also included. We hypothesize those cities closer to provincial centre can serve as markets and employment centres for rural households residing nearby.

³ One may argue that tax may have negative impact on agriculture reducing incentives of farmers. However, according to the survey of farmers, they consider the size of land tax fair and are even ready to pay higher rates (USAID, 2008). Therefore, we assume it does not distort incentives of farmers.

Related to this, infrastructure is expected to contribute positively to nonfarm employment by lowering costs (better roads, access to electricity, clean water). On the other hand, road infrastructure can also lead to stronger competition from the outside world. As indicators for infrastructural development we use the average time to get to the bus-stop and the percentage of people with access to clean water. We expect time to the bust-stop to have a negative impact on the magnitude of nonfarm employment, while the access to clean water will have a positive impact. Finally, we included provincial dummies and a dummy for 2006 in the regression.

Finally, we included the number of cattle at rayon level at the beginning of the year as a variable which can influence both the incentive and capacity of the RNFE. A larger cattle herd can discourage nonfarm activities driven by a lack of access to credit resources or inability to earn enough from agricultural production, but at the same time it can also stimulate nonfarm development through access to cash resources.

5.2 Empirical results

Descriptive statistics and regression results (coefficients and robust standard errors) are presented in tables 6 and 7. The results for the land indicators confirm our hypothesis of an U-shaped relationship between land and share of time in private non-farm employment. Total land per capita has a significant negative coefficient and land squared has a significant positive coefficient. This indicates that in areas with high pressure on land labour is “pushed” into the nonfarm sector, but that at some point higher land size will contribute positively to the magnitude of the RNFE. The land quality indicators confirm this idea. In depressed areas with low quality land (as measured by low land tax) participation in non-farm activities is higher, as shown by the significant negative coefficient for land tax. The interaction term of the size of land per capita and tax is, however, positive and significant, indicating that more arable land combined with higher quality increases hours worked in the RNFE. This is again consistent with the “pull” story behind non-farm activities, when dynamic agriculture creates opportunities in the RNFE.

Table 6. Descriptive statistics, observations are weighted

Variable	Obs.	Mean	Std. Dev.	Min	Max
% of time in total non-farm employment	80	0.5	0.2	0.1	1.0
% of time in private nonfarm employment	80	0.3	0.2	0.0	0.8
% of time in public nonfarm employment	80	0.2	0.1	0.0	0.4
Total land per capita, ha	80	0.4	0.2	0.1	1.2
Total land per capita squared	80	0.2	0.3	0.0	1.5
Mean size of the land tax, som	80	128.5	39.3	64.5	185.0
Land per capita* size of the land tax	80	51.2	40.1	16.0	201.0
Number of cattle, beginning of year	80	63435.8	78847.0	2090.1	432511.8
% of the population having access to water via infrastructure (pump, pipe)	80	81.3	29.7	0.0	100.0
Average time to bus-stop, minutes	80	13.1	4.9	5.0	31.7
Dummy for 2006	80	0.5	0.5	0	1
Dummy for resort area in Issyk-Kul province	80	0.03	0.16	0	1
Dummy for rayons with cities	80	0.34	0.48	0	1
Dummy for rayons with cities*distance to provincial centers, km	80	15	32	0	120
Dummy Jalalabat province	80	0.2	0.4	0	1
Dummy Osh province	80	0.16	0.37	0	1
Dummy Batken province	80	0.08	0.27	0	1
Dummy Naryn province	80	0.11	0.32	0	1
Dummy Talas province	80	0.1	0.3	0	1
Dummy Issykkul province	80	0.13	0.33	0	1

Development of infrastructure, measured by percentage of households having access to clean water does not have significant effect on non-farm employment, neither time needed to get to the bus station. Potential explanation for this can be heterogeneity across the same rayon which we can not capture by our variables. The number of cattle also does not have significant effect on the share of time in nonfarm activities. We also tried to include quadratic term, but it did not improve the result.

The positive and significant coefficient for resort areas supports theoretical prediction that non-farm activities can be also stimulated by “other motor of growth” than agriculture. The negative coefficient for the dummy for rayons with provincial capitals could be the result of the inclusion of only villages and not semi-urban areas. Alternatively, the proximity of big city can also result in increased competition in the nonfarm sector or stimulation of agriculture by opening up markets for agricultural products. It is important to mention that we do not get significant results for the regression where we explain the share of time in public nonfarm activities. Probably the share of time in public employment may require different specification. Therefore, it is important to consider public nonfarm activities separately.

Table 7. Empirical results of the model estimation, OLS with robust standard errors⁴

Variables	% of time in private nonfarm employment	% of time in public nonfarm employment	% of time in total nonfarm employment
Total land per capita	-2.167*** [0.506]	0.269 [0.304]	-1.891*** [0.643]
Total land per capita squared	0.728*** [0.234]	-0.0611 [0.139]	0.662** [0.305]
Mean size of tax rate, som	-0.00357*** [0.00123]	-0.000546 [0.000614]	-0.00414*** [0.00133]
Mean size of tax rate*total land per capita	0.00754** [0.00297]	-0.00187 [0.00151]	0.00566* [0.00314]
Number of cattle, beginning of the year	-4.26E-07 [3.05e-07]	2.17E-07 [1.87e-07]	-2.10E-07 [2.71e-07]
Dummy for resort area	0.624*** [0.144]	-0.201** [0.0862]	0.421** [0.161]
% of access to water	-7.59E-05 [0.000711]	0.000581 [0.000496]	0.000507 [0.000929]
Time to bus-stop	0.000592 [0.00421]	0.00408 [0.00264]	0.00474 [0.00470]
Dummy for rayons with cities*distance to provincial centers	-0.00153** [0.000711]	0.000394 [0.000426]	-0.00113 [0.00104]
Dummy for rayons with cities	-0.00283 [0.0384]	-0.0116 [0.0196]	-0.0135 [0.0452]
Observations	80	80	80
R-squared	0.588	0.387	0.457

Note: *** p<0.01, ** p<0.05, * p<0.1 Chui province is used as a base. Robust standard errors are in parenthesis

In order to illustrate the findings and test whether “push” or “pull” factors are most relevant for the development of the RNFE in Kyrgyzstan, figure 7 presents simulations of the combined impact of land and its quality on the share of time worked in private non-farm employment to total time worked. The starting point is a hypothetical rayon with mean total land per capita of 0.3 ha (mean level in the sample is 0.4 ha and maximum 1.2 ha) and land quality of 110 (mean value in the sample is 128.5 and maximum 185). Using first four coefficients

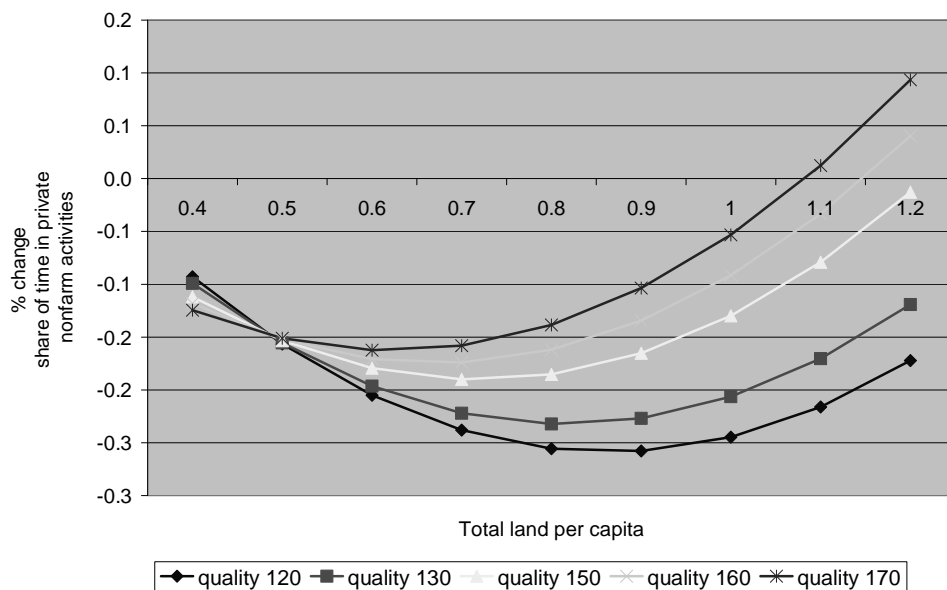
⁴ Weights are used. The results are robust if regression is estimated without weights.

from the first regression in table 7, we simulate by how much the share of time in nonfarm employment will change if we start increasing land by 0.1 for different levels of land quality (land tax 120, 130, 150, 160, 170 som).

The figure demonstrates that all curves have a U-shape: Increasing the availability of land would lead to a decrease in the share of private nonfarm time until some point after which the share would start increasing. These two parts on the curve reflects “push” and “pull” scenarios. Curves based on higher quality of land have the switch point at lower size of land meaning that less land is needed for agriculture to become a driving force for a profitable nonfarm economy when the quality of land is higher.

If, for instance, we increase the size of land of average quality of 130 from the value of 0.3 by 0.5 ha, this will result in a decrease of non-farm time share with accelerating rate by 23%. However, after further increase to 0.9 ha the negative effect starts decreasing, but still is negative even if we increase the land size till the maximum level of 1.2 ha. Different picture evolves if you simulate increase in the size of land for the size of land of better quality. If you choose very high land quality of 170, increase the size of land from the value 0.3 by 0.5 will decrease the nonfarm time share only by 13.8%. If you increase the size of land till 1.2, the share of time in nonfarm activities will increase by 9.3%. This is, however, rather an extreme case since only several rayons in the Kyrgyz Republic have an average size of land per capita of more than 1 ha with a quality close to 170.

Figure 7. Simulation of the change in share of time worked in private non-farm employment to total worked time after increase of total land for different levels of quality, %



Source: authors' estimation.

In sum, empirical analysis of non-farm employment reveals that participation in the RNFE in Kyrgyzstan is mainly driven by “push” factors, namely high population pressure on total land. Only in resource-rich rayons with extremely favourable agricultural conditions and low population pressure or in areas close to resorts, non-farm employment can be potentially attributed to “pull” factors.

6. Conclusions

Analysis of non-farm activities in the Kyrgyz Republic based on three representative household budget surveys reveals that the RNFE played a substantial role, accounting for almost 40% of rural primary employment in 2006, and expanded significantly since 2003 which coincided also with accelerating external and internal labour migration. The increasing share of nonfarm income from 37% in 2005 to 47% in 2006, and increasing share of nonfarm time in the total time worked from 38% in 2003 to 50% in 2006 also indicate importance of the RNFE for

the wellbeing of rural households. Non-farm activities were particularly important in all southern provinces (Osh, Batken and Jalalabat) and in Chui in the north. The sectors providing most nonfarm employment were education, health, trade, construction and transport. The most important source of non-farm income was salary, followed by income from processed crop products and income from self-employment. Income from processed animal products was the fourth important source of non-farm income at the national level, but the largest source in Naryn province in 2005, an area with developed cattle breeding. Primary non-farm employment provided 8 hours workload and was mainly related to work in organisations, firms etc. Secondary non-farm employment was relatively unimportant and mostly consists of self-employment or working for private individuals. It follows the seasonal pattern of agriculture, which limits its potential to smooth labour supply in the lean agricultural seasons.

Regression analysis of the share of time worked in nonfarm activities to total hours worked at rayon level demonstrates that the size of land per capita and its quality are crucial factors explaining the magnitude of non-farm activities. Land has a non-linear effect on time worked in non-farm activities. In areas with lack of arable land people are “pushed” into non-farming, while in areas with a lot of fertile arable land, in contrast, people are “pulled” into the RNFE. Taking into account that almost in all provinces the average size of land is much less than the size necessary to achieve an increase in non-farm employment, the majority of non-farm employment in the Kyrgyz Republic was driven by lack of arable land in 2005 and 2006.

The strong negative ties between the RNFE and the size and quality of land implies that nonfarm activities are relatively accessible to the poor but do not necessarily generate high returns. The predominant “push” nature of the RNFE also signals that the current state of agriculture is not conducive to the development of nonfarm activities with higher returns in the context of small and fragmented farming and underdeveloped markets. In these circumstances, besides stimulating agricultural development per se, it is important to identify and focus on general factors effecting profitability and expansion of the current rural nonfarm activities, especially in areas where the capacity of agriculture is constrained by the natural environment. Only in the few areas with extremely favourable agricultural circumstances or with resorts, specific policies to increase access of the poor to profitable nonfarm activities are useful.

Annex

Total income of the household is constructed from the following items: farm income, income from salary and self-employment from main work, income from secondary and tertiary work, in-kind payments, stipends, aliments, social benefits, net transfers, interests and dividends. Farm income includes net income from cattle, crops, animal products and plant products. The net value is obtained by subtracting gross costs from gross output value. The gross value for crops is estimated based on median consumption prices at the provincial level multiplied by the volume harvested. The gross value for animals is estimated based on the information of sold animals and median prices for regions.

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