THREE ESSAYS IN THE ECONOMICS OF INEQUALITY AND WELL-BEING IN KYRGYZSTAN

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Abstract

This dissertation analyses the economic and social consequences of transformation from socialism to a market based system. Employing applied microeconomic approach and using household and individual level data from Kyrgyzstan, the research investigates the determinants and welfare impact of smallholder participation in export markets, dynamics of intergenerational educational mobility, and drivers of economic inequality between ethnic groups.

In the first substantial chapter, the results indicate that participation of smallholders in export markets is determined by location, the crops they produce, and employment decisions of its working members. Welfare gains from export participation - compared to domestic market participants – are largely narrow, albeit varying dependent upon the welfare indicator used. The results point to positive externalities from participation in international markets, such as obedience to product quality requirements, however, the results largely suggest that there is not much benefit for smallholders in participating in the global markets.

In the second substantial chapter, the level of intergenerational educational mobility after twenty years of transition is found to be very high compared not only to the transition countries, but also internationally. This outcome is largely explained by liberalization and expansion of the higher educational institutions, which enroll more students compared to the socialist times. However, the chapter documents that the younger population's higher education attainment is strongly associated with educational and social background of parents – the result generally consistent with the recent developments in advanced transitional economies.

Finally, the last chapter finds that economic inequality between two conflictive ethnic groups exists only for one out of three welfare indicators analyzed. Motivated to investigate a popular belief that economic disparity between the two ethnic groups was a source of the inter-ethnic violent conflict in 2010, the chapter raises an issue of misleading nature of visible welfare indicators that may drive people's perception.

Keywords: agriculture, Central Asia, economic development, educational attainment, exports, horizontal inequalities, intergenerational mobility, Kyrgyzstan, poverty, smallholder, transition economy.

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Eidesstattliche Erklärung

Ich versichere, dass ich die von mir vorgelegte Dissertation selbstständig und ohne unerlaubte Hilfe angefertigt und andere als die angegebenen Hilfsmittel nicht benutzt habe.

Damir Esenaliev

Berlin, 24 April 2013

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List of Abbreviations

ABCC	Agribusiness Competitiveness Center
ATE	Average Treatment Effect
AUCA	American University of Central Asia
DIW Berlin	German Institute for Economic Research
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GNI	Gross National Income
HH	Household
ILO	International Labour Organization
ITC	International Trade Center
IV	Instrumental Variable
KIHS	Kyrgyz Integrated Household Survey
KMPS	Kyrgyz Multipurpose Poverty Survey
KPMS	Kyrgyz Poverty Monitoring Survey
LIK	Life in Kyrgyzstan Panel Survey
ML	Maximum Likelihood method
MTC	Ministry of Transport and Communication
NSC	National Statistics Committee of the Kyrgyz Republic
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PISA	Programme for International Student Assessment
PS	Propensity Score
PSU	Primary Sampling Unit
SEU	Sheep Equivalent Unit
UCA	University of Central Asia
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
WDI	World Development Indicators
WFP	UN World Food Programme
WTO	World Trade Organization

Chapter 1:

Introduction

1.1. Research Motivation

The fall of the Berlin Wall in 1989 and dissolution of the Soviet Union in 1991 marked a fundamental turning point for the socialist countries in Europe and Central Asia. The following 20 year transition from socialism to a market system brought remarkable changes to the lives of hundreds of millions. A typical reform-induced transition country faced an output shock in the first years and experienced the transformation of not just product and labor markets but also political and economic institutions. Collectively, these developments had an immense impact on people's well-being, behavior, choices, and agency.

From the outset of transformation, the transition countries have served as an arena for contesting policy paradigms on the speed of reforms and a fertile field for variants of policy interventions. The developmental progress has been uneven with some countries joining top developed economies and democracies, whilst a number of countries still maintain key political and economic elements of the socialist system. In this regard, the former Soviet Union members, and especially, the countries in Central Asia, represent a large share of the less progressed group of countries (Spechler, 2008; EBRD, 2012).

Not surprisingly, the transition process is an active area of economic research (Campos and Coricelli, 2002; Falcetti et al., 2006; Havrylyshyn, 2001; Kornai, 2000; Roland, 2002; Sonin, 2013; Svejnar, 2002). My dissertation contributes to the empirical microeconomic literature by improving our understanding of the long-term economic and social effects of transition. Applying econometric techniques to household and individual level data, I analyze recent developments in well-being and inequality with a focus on three distinct phenomena: i) agricultural markets; ii) intergenerational transmission of education; and iii) horizontal inequality.

The dissertation addresses two research gaps in Central Asia. First, there is relatively little research on microeconomic aspects of transition in Central Asia compared to other post-socialist and development countries (Anderson and Pomfret, 2003; Brück et al., 2013). The

scarcity of research is partly due to limited and restricted availability of microeconomic datasets for research purposes. Second, most of the existing microeconomic research examined short-term effects of transformation that took place in the first decade of transition. Thus, it is important to continue examining the consequences of the recent developments and policy choices. For example, Kyrgyzstan, Tajikistan, and Uzbekistan have become large migrant-sending countries with the remittances that the labor migrants send home playing an increasingly important role for the whole economy, but with social costs (Abazov, 1999a; Bennett et al., 2013).

1.2. Contributions to the Literature

This dissertation contributes to three different strands of the economic literature. First, it contributes to a growing body of microeconomic research that investigates participation of agricultural households in domestic and international markets. Second, it examines intergenerational educational mobility in a low-income transition economy. And lastly, it contributes to the literature on conflict and economic inequality between ethnic groups.

A typical package of transition reforms included liberalization of prices and trade with aim to benefit from participation in international markets. Literature suggests that economic growth and trade are positively correlated; however, the distributional outcomes of trade are not clear. In this regard, we still lack sufficient empirical evidence, based on country-case studies and household-level data, to understand how the gains from trade are distributed and whether they actually reach the poor (Winters et al., 2004). As poverty in developing and transition countries is mostly a rural phenomenon, the greater involvement of small-scale farmers in trade depends on market connections, both domestically and globally. In addition to traditional constraints, like the lack of infrastructure, assets and insurance, smallholder market access is increasingly challenged by new developments, especially rising quality requirements. Contributing to this literature, the dissertation investigates determinants of market and export participation of smallholders in Kyrgyzstan.[1] The literature, for instance, suggests that a low level of productive asset ownership – closely associated with poverty - may be a reason for non-participation (Boughton et al., 2007). I extend this analysis by

[1] This chapter is based on ongoing joint research with Isabel Teichmann (DIW Berlin).

examining individual and community level characteristics. More importantly, this research quantifies the welfare effect of participation in export markets, and hence, contributes to the debate of whether or not trade is good for the poor.

Distributional outcomes associated with the transition have been at the center of microeconomic empirical research in post-socialist countries. Along with transitory deterioration of living standards, inequality increased in the first transitional years (Milanovic, 1999; Milanovic and Ersado, 2008; Mitra and Yemtsov, 2006). As inequalities in income and opportunities tend to transfer across generations (Andrews and Leigh, 2009; Blanden, 2013), the literature on intergenerational mobility in post-socialist countries largely finds a strengthened association of a socio-economic status between generations. However, this evidence is mostly based on studies of middle-income post-socialist countries in Europe, such as Bulgaria, Poland and the Baltic countries, which transitioned relatively quickly from the socialist to market model, making substantial development quickly during the later phases of transition (Hertz et al., 2007; Hertz et al., 2009; Verashchagina, 2012; Spagat, 2006). There is no detailed research on intergenerational mobility in low income transition countries. Because these countries experienced higher rates of poverty and inequality in the early transition, intergenerational links could have strengthened more than in the middle-income transition countries. This dissertation addresses this research gap by investigating the degree, dynamics and gender aspect of intergenerational educational mobility in Kyrgyzstan, a low-income economy.[2]

Similar to the experience of many countries emerging from colonization, Kyrgyzstan encountered an episode of the mass inter-ethnic violent conflict in June 2010 between the ethnic Kyrgyz and Uzbeks. This violent clash left around 470 people dead, 400,000 people displaced, and a large number of properties destroyed (Bond and Koch, 2010; Melvin, 2011; Kyrgyzstan Inquiry Commission, 2011). The causes of the event are not entirely clear, as it initially involved a wide range of political forces and social groups. But, as the fighting started, ethnicity became a defining factor of the violence, which reflected underlying tensions between the two communities (Melvin, 2011).

[2] This chapter is based on a joint work with Tilman Brück (SIPRI and Humboldt University of Berlin). This research is published as a DIW Berlin Discussion Paper #1284 and IZA Discussion Paper #7318.

Much of the literature on violent conflict focuses on horizontal inequalities, which are "inequalities in economic, social or political dimensions or cultural status between culturally defined groups" (Østby, 2008b. p.3). It is argued that horizontal inequalities enhance grievances and group cohesion among the relatively deprived and thus facilitate mobilisation for violent conflict (Gurr, 2000; Stewart, 2008). Quantitative research generally confirms a positive relationship between horizontal inequality and the onset of violent conflict (for example, Mancini et al., 2008b; Murshed and Gates, 2005; Østby, 2008b; Østby, 2008a). While several indicators are proposed to measure horizontal inequalities (Mancini et al., 2008b), very little research investigates which welfare indicators should be used. The dissertation contributes in filling this gap by analysing the sources of economic horizontal inequality between two conflictive ethnic groups in Kyrgyzstan, the Kyrgyz and the Uzbeks, by employing the decomposition method mainly used in labor economics.[3]

1.3. Kyrgyzstan Country Context

Kyrgyzstan, or the Kyrgyz Republic, has a unique transition profile among Central Asian countries. The five countries in the region share common historical and cultural legacy, but differ in terms of natural resource endowment, political regimes, and the post-socialism development strategies.[4] Among these countries, Kazakhstan and Kyrgyzstan have made more reforms than the other three (EBRD, 2012; Spechler, 2008). The Kyrgyz Republic, an early and fast reformer, is a particular case of a non-European country that largely followed the "shock therapy" approach, by rapidly liberalizing, privatizing, and restructuring its economy (Dąbrowski et al., 1995; Abazov, 1999b), although the pace of reforms has slowed during the second decade of its transition.

Kyrgyzstan experienced a dramatic decline in national output with its GDP halved in the first decade of transition compared to 1989. The country eventually recovered to its pre-transition level of per-capita GDP after 20 years and is on the verge of becoming a middle income economy. The transition reforms and openness to trade induced profound sectoral shifts in its economy with the services sector playing an increasingly important role for growth and

[3] This chapter is based on a joint work with Susan Steiner (Leibniz Universität Hannover). This research is published as a DIW Berlin Discussion Paper #1252.

[4] These countries are Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan.

employment, while agriculture lagged behind. The share of agriculture's value added in GDP declined to around 20 percent in 2011 from its 1996 peak of 50 percent. Nevertheless, agriculture provides jobs for a third of the labor force and it is important for livelihoods of the country's predominantly rural population (NSC, 2012a).

A high incidence of poverty in Kyrgyzstan, experienced in the first decade of the transition, has steadily declined in the 2000s. By 2011, about a third of the country's population was classified as poor, which is good progress compared to 1998's peak when 55 percent of the population experience poverty. Income inequality, measured by the Gini index, followed an 'inverted U-shape' trajectory – a typical development in most transition countries (Mitra and Yemtsov, 2006). In the late 1990s the country experienced a sharp - more than double - rise in inequality, but as economic growth resumed, inequality returned to a relatively low level by international standards.

Table 1. 1: Economic Growth, Poverty, and Education
Average per period

	1988-89	1990-94	1995-99	2000-04	2005-09	2010-11
Growth						
Real GDP growth, %	5.9	-11.2	4.1	3.8	3.4	1.4
Real GDP per capita, 1989=100	100	80	57	66	78	85
GNI per capita (Atlas method), USD	…	447	360	318	638	860
Share of agriculture in GDP, %	33	38	43	36	29	20
Share of services in GDP, %	…	29	35	38	49	51
Poverty and inequality						
Poverty headcount, % of population	…	40.0	57.7	53.9	36.3	35.3
Income Gini index, %	26.0	53.7	36.0	33.2	37.0	…
Education						
Gross secondary school enrollment, %	104	97	80	86	86	86
Gross tertiary school enrollment, %	28	24	25	40	46	41
Public spending on education, % of GDP	…	5.6	4.6	4.2	5.8	5.8

Source: World Development Indicators (2013)

Kyrgyzstan, like other post-socialist countries, inherited a high human capital stock thanks to the Soviet Union's universal schooling policy and investments (Mertaugh, 2004). The educational attainments continued and, even, progressed during transition times due to expanded opportunities in the higher education system. However, the post-secondary

educational system has not adjusted to the needs of the transformed labor markets and skills mismatch is an acute issue (World Bank, 2012).

In sum, the radical transition experience of Kygyzstan taught several lessons. First, the "shock therapy" approach worked reasonably well initially, although it came with a high social cost (Abazov, 1999b). In this regard, it is claimed that the choice of reforming strategy - gradual or radical - does not make much difference for development outcomes (Sonin, 2013). Second, Kyrgyzstan exemplifies a case where the transition development has struggled because the institutions related to governance, business environment, and property rights are not in place. Third, political instability, evidenced by the forced removal of two presidents in 2005 and 2010, is extremely disruptive for economic growth and further reforms. The nation-building is a complex process that requires balancing the interests of various groups in a dynamic multi-ethnic society. Imbalances may result in inter-group tensions, often in destructive form, as it evidenced by the inter-ethnic violent conflict in south Kyrgyzstan in 2010.

1.4.Data

Historical importance of the post-socialist transformation has brought increased attention of policymakers and researchers and, thus, necessitated the collection of macro and micro level information. The data collection systems, thanks to the high human capital legacy from the previous system, were adjusted quickly and micro data at the individual, household and firm level are increasingly available (Filer and Hanousek, 2002). Select Central Asian countries, depending on the openness of the political regimes, have a wealth of micro-data for research (Brück et al., 2013). Kyrgyzstan has collected relatively more micro-surveys than other countries in the region, and this dissertation makes a use of household and individual level data to explore the research questions.

Analysis in Chapters 2 and 3 are based on the first two waves of the new "Life in Kyrgyzstan" (LiK) individual panel survey. LiK was conducted as a part of the research project "Economic Transformation, Household Behavior and Well-Being in Central Asia: The Case of Kyrgyzstan," funded by the Volkswagen Foundation in 2010-2012 (details in Brück et al., 2013). This panel survey was incepted in 2010 and conducted annually over the

period 2010-2012 by the German Institute for Economic Research (DIW Berlin) in collaboration with the Humboldt University in Berlin, CASE-Kyrgyzstan, and the American University in Central Asia. Data collection for the LiK survey took place annually between September/October and December. Based on 2009 Kyrgyz population census, the initial sample of the survey included 3000 households and 8160 adult individuals in 120 communities. The households in the sample were obtained by stratified two-stage random sampling with probabilities proportional to population size. The strata were formed by the two cities of Bishkek and Osh as well as the urban and rural areas of the seven oblasts, totalling 16 strata. The LiK sample is representative at the national, rural/urban and north/south levels.

The 2011 LiK survey collected information at individual, household and community levels. Among a number of topics covered in the LiK survey, this dissertation uses 1) community characteristics and food price information (in Chapter 2); 2) household composition, assets (including land and livestock), income and expenditures, migration, shocks, and agricultural activity and participation in markets (in Chapter 2); and individual level data on education, labor market status, and parental background (in Chapter 3).

In addition to the LiK data, Chapter 3 uses household surveys conducted in Kyrgyzstan in 1993 and 1998. Both data sources are compatible with the World Bank's Living Standards Measurement Surveys (LSMS) and contain information about the parental education. The first data source, the 1993 Kyrgyz Multipurpose Poverty Survey (KMPS), is a nationally representative survey designed to measure living standards. The sample contains about 2,000 households with 10,000 individuals. The migration section of the adult questionnaire contains recall information about the level of parental education. The second data source, the 1998 Kyrgyz Poverty Monitoring Survey (KPMS), is a nationally representative household survey with a sample of 3,000 households. The family module comprises retrospective questions about parental education and sector of occupation.

Chapter 4 is based on the Kyrgyz Integrated Household Survey (KIHS), conducted by the National Statistical Committee (NSC) of the Kyrgyz Republic (Esenaliev et al., 2011). Since its inception in 2003, this annual survey covers around 5,000 households, collecting most data on a quarterly basis. The sampling procedure is stratified multistage random sampling, and the survey is representative at the national, rural/urban, as well as oblast (province) levels. There are 15 strata in total, corresponding to urban as well as rural areas of the seven

oblasts plus the capital. The survey is a rotating panel, with a maximum substitution of 25 percent of households in each year. This dissertation employs information from KIHS on demographics, education, employment, household expenditure, housing conditions, and assets.

1.5. Empirical Approach and Results

All three chapters employ microeconomic approaches in order to better understand household and individuals behavior. Chapter 2 aims to establish a causal welfare effect from participation in exports, while the Chapters 3 and 4 exploit regression and decomposition methods.

In the empirical analysis of Chapter 2, the determinants of smallholder export participation are estimated as the conditional probabilities of taking part in export markets, based on a logit model. For the estimation of the welfare effects from export participation, I use a variety of methods from the treatment-effect literature, including regressions on covariates, propensity-score matching, and the entropy balancing. In addition to quantitative data, this chapter benefits from qualitative field work conducted in October 2012, which consisted of interviewing 15 households that had participated in LiK across three regions of Kyrgyzstan. The aim of qualitative work was to gain insights into market and export participation by smallholders as well as to clarify the concepts and assumptions underlying the research.

The results indicate that market and export participation of a smallholder is determined by its location, the products they produce, and the employment decisions of its working members. Welfare gains from export participation (compared to domestic market participants) measured by agricultural income, are found to be positive, but no economic gains were found when aggregate household income, consumption or assets holdings were used. Finally, the adherence to quality standards seems to play almost no role in welfare gains of the export participants. These findings broaden our understanding of the catalysts and barriers of smallholder market access as well as distributional gains from export market participation.

Chapter 3 investigates how intergenerational transmission of education in Kyrgyzstan has evolved over two decades of transition and analyzes whether there is difference in mobility on gender lines. This chapter exploits two common indicators of correspondence in schooling

between parents and children: a regression coefficient by using OLS and a correlation coefficient based on the three data sources along the gender and age-cohort lines. The regression results are enriched by exploiting individual level and parental characteristics.

The findings indicate that Kyrgyzstan has maintained strong educational mobility, comparable to the levels in Soviet times. This is due, firstly, to the dispersed distribution of educational attainments in the parental population, and secondly, to the increasing number of university graduates after tertiary educational institutions were liberalized. However, consistent with similar studies based on countries in Eastern Europe, there is a sharp increase in the educational association between parents and children in the 2011 data for the population aged 25-34; the generation whose schooling and employment experience was most affected by the transition. This may indicate that higher parental socio-economic status may play a more prominent role in children's enrolment at the post-secondary education, while children of less educated parents have fewer opportunities. In addition, the lower rate of educational mobility of females - found for older generations – equalled to the mobility of males in the younger-aged population. While this chapter does not establish causality, the results are important as they: 1) provide evidence on the effect of the whole cycle of transition to intergenerational transmission; 2) address the research gap by exploring a case of a low-income transition country; and 3) investigate the gender dimension of the topic.

Chapter 4 analyzes horizontal inequalities between two conflictive ethnic groups, the Kyrgyz and the Uzbeks in Kyrgyzstan, by employing the Oaxaca-Blinder decomposition. This decomposition method was originally applied in labor economics to explain wage gaps between groups, such as between women and men, or between blacks and whites. The decomposition determines how much of the wage gap can be attributed to differences in group characteristics and how much is due to differences in the coefficients, sometimes interpreted as discrimination. This technique is increasingly used to examine differences in living standards (in terms of either income or household expenditure) between ethnic groups in developing countries. However, few studies discuss the relevance of inequality between ethnic groups for the outbreak of violent conflict.

The major finding of this chapter is that the welfare differentials between Kyrgyz and Uzbeks depend on the welfare indicator used. For instance, Uzbeks are not better off if welfare is measured in terms of household expenditure. They are, however, clearly more prosperous in terms of the value and the size of their houses. Hence, the choice of welfare indicator is

essential in studies of horizontal inequality, as it is more likely that it is visible aspects of life that drive people's perceptions about other ethnic groups' standard of living. Decomposing welfare differentials between Kyrgyz and Uzbeks shows that the gap in expenditure is due to differences in group characteristics, such as household composition and livestock ownership, whereas the gap in assets and house values remains unexplained. The latter result is associated to the effect of unobservable characteristics, for example, to differences in cultural and economic preferences between the two groups.

1.6. Concluding Remarks

This dissertation highlights some important features of the recent transition developments in Kyrgyzstan that may be generalized to some extent to the other Central Asian countries, in particular, and to transition and developing countries, in general.

Creating a market-based economy from tightly regulated, centrally planned, system requires establishing market mechanisms and private ownership. Therefore, a typical reform package included small-scale privatization, including land in most countries. Kyrgyzstan followed a radical approach in distributing most state-owned agricultural lands to households, thus creating thousands of small-scale farmers. It is believed that distribution of land in early transition years helped ease food security and unemployment issues; however, it became evident over years that small-scale farming is not conducive to productivity and efficiency. Moreover, despite the participation of smallholders in markets, including export, welfare gains from participation are not large.

An increased share of university educated in young-age population raises issues of oversupply and skill mismatch. This process is followed by relative inequity because higher educational attainments are increasingly associated with parental background. On the one hand, this inequity is not surprising given the weakened role of equalizing institutions and reduced demand for skills, especially in rural labor markets. On the other hand, low intergenerational mobility tends to be highly associated with both vertical and horizontal economic inequalities over time – a development that calls for policy intervention.

The inequalities in access to resources and opportunities among groups - be it along regional or ethnic lines - were claimed to be a high risk factor for political stability and economic

development (Stewart, 2008; Østby, 2008a). This consideration is especially important for former Soviet Union countries that, in addition to undergoing economic and institutional transformations, are also still in the learning phase of nation-building. Very few doubt that equity and the inclusion of various groups in the political and economic spheres are important elements of nation-building, but it seems very difficult to implement these in practice as evidenced by a number of internal violent conflicts, mostly along ethnic and regional lines. As discussed in this dissertation, (perceived) economic inequality between groups may be a triggering factor for a violent conflict, even if there is no such actual inequality. The fact that the visible household welfare of one ethnic group may give a misleading perception of relative advantage may be taken as objective evidence while undertaking advertising campaigns designed to educate the population.

Chapter 2:

Determinants and Welfare Effects of Smallholder Export Participation

2.1. Introduction

There is a renewed emphasis on smallholder agriculture to achieve global food security and poverty alleviation in times of increasing pressures on food production. These pressures originate from rising demand for food due to population growth and income growth in emerging countries, expansion of bio-fuel production and climate change (World Bank, 2007). This raises at least two issues. First, the integration of smallholders in global trade directly leads to the big unresolved question on whether trade is good for the poor. In this debate, we still lack sufficient empirical evidence based on country-case studies and household-level data to determine how the gains from trade are distributed and whether they really reach the poor (Winters et al., 2004). Second, the greater involvement by small-scale farmers in trade not only depends on improvements in productivity, but also on better connections to markets, both domestically and globally. In addition to traditional constraints, such as lack of infrastructure, a lack of insurance and low level of productive assets, access to export markets by smallholders is increasingly challenged by new developments, especially by rising quality requirements. Quality standards have become particularly important for high-value crops, such as fresh fruits and vegetables, dairy products, meat and fish. It is widely debated whether they support or hinder smallholder market access and how they impact income (OECD, 2006; OECD, 2007; García Martinez and Poole, 2004; Balsevich et al., 2003; Boselie et al., 2003).

These aspects of smallholder market participation are crucial for Kyrgyzstan since agriculture is an important sector of employment and household incomes. The country is dominated by small-scale farms that produce agricultural products for own consumption as well as for sale in domestic and international markets. In fact, smallholders' participation rate in both markets is high in Kyrgyzstan, given the reliance of rural livelihoods on agricultural production.

However, there is also a sizeable share of smallholders who do not take part in sale activities. While it is important to identify the reasons that smallholders do not participate (Atamanov and Van den Berg, 2012a), this analysis concentrates on those smallholders who are active in markets.

Against this background, we analyze the export participation of small-scale farmers in Kyrgyzstan. In particular, we are interested in (i) the determinants of smallholder participation in the export markets; and (ii) the associated welfare effects of the export sales versus domestic market sales. Since Kyrgyzstan cannot avoid the rise in quality standards in its major agricultural export destinations of the European Union, Russia and Kazakhstan,[5] we focus on the impact of quality requirements on the smallholder export participation and welfare. Our empirical analysis is based on a novel dataset, the 2011 "Life in Kyrgyzstan" panel survey (LiK 2011) (Brück et al., 2013).[6] In particular, we use a designated section of the survey designed to capture information on farm households' sales activities, export participation and quality-related aspects of production. In order to identify the determinants of smallholder export participation, we estimate the conditional probabilities of participating in exports using a logit model. We estimate the associated welfare effects by applying a number of methods from the treatment-effect literature, including regression on covariates, propensity-score matching, and the entropy balancing. Additionally, we complement and assess the quantitative results with the findings from a qualitative field study conducted in October 2012 in Issyk-Kul, Osh and Talas oblasts (administrative regions).

We find that export participation is largely determined by the household location, higher allocation of labor in agriculture, and the production of exportable products. Adherence to quality standards does not seem to be particularly important for either export participation or welfare gains. With regard to welfare, we find a positive though marginally significant agricultural income effect for export participants compared to households that sell only in domestic markets. However, the welfare analysis conducted using aggregate household income, consumption or ownership of durable assets, reveal no welfare gains. This particularly counter-intuitive result we relate to the market mechanisms that equalize the farm-gate export prices to the level of domestic market prices. We discuss some reasons of

[5] Due to the establishment of supermarkets, quality standards are increasingly imposed by Russia and also Kazakhstan (World Bank, 2011).

[6] The panel survey is conducted annually, starting in 2010.

such circumstances, including the price-setting role of intermediaries and the small quantities of products supplied.

This chapter contributes to the quantitative literature on smallholder market participation. One strand of this literature estimates the determinants of market participation and its intensity, i.e. the amount of a product sold given market participation. The econometric analyses of household surveys in this category range from sector studies (for instance, Goetz (1992) for coarse grains in Senegal; Key et al. (2000) for maize in Mexico; Boughton et al. (2007) for maize, cotton and tobacco in Mozambique) to total agricultural sales (e.g., Heltberg and Tarp (2002) for Mozambique). Major determinants of smallholder market participation identified by this literature are the importance of shocks, the availability of off-farm employment and the ownership of transport equipment (Heltberg and Tarp, 2002). However, these studies do not differentiate between domestic and export market participation. The study by Bozzoli and Brück (2009) analyzes, among other topics, the market participation of farm households in the post-war environment in Northern Mozambique and finds that market participation has positive welfare effects.

Another strand of the quantitative literature deals with the welfare effects of export participation.[7] The econometric studies in this group tend to focus on smallholder export participation in specific sectors and regions within a country. They include McCulloch and Ota (2002) on export horticulture in Kenya, Maertens and Swinnen (2009) on the French beans sector in Senegal, and Maertens et al. (2011) on tomato exports in Senegal. These researchers find that export participation significantly increases smallholders' household income. Moreover, they stress the importance of the employment channel besides smallholder production for exports. These studies are largely motivated by the above-described rise in quality requirements. By choosing sectors that face strict quality requirements, these studies contribute to the debate on smallholder market access in export markets.

Our analysis is closely related to the second strand of literature. However, unlike these studies, we provide a more general analysis by performing a country-wide study and investigating the entire agricultural sector. Moreover, we cover quality aspects not only

[7] Although the primary focus is on the welfare effects, however, the determinants of market participation are estimated as an intermediate step.

indirectly by the sector choice, but include them directly in the set of explanatory variables. In addition to household income, used in the aforementioned studies, we use consumption expenditure and asset indices as alternative and less volatile measures of household welfare. To the best of our knowledge, we are the first to provide an econometric study on smallholder market participation not only for Kyrgyzstan, but also for Central Asia. A novel feature of our analysis with respect to both strands of literature is that we explicitly differentiate between domestic-market and export participation. Finally, the quantification of welfare effects contributes to narrow the knowledge gap in household-level trade-poverty analysis.

The remainder of the chapter is organized as follows. In Section 2.2, we provide background information on agriculture and trade in Kyrgyzstan. Section 2.3 describes the estimation methodology. Section 2.4 presents the data source and depicts the key descriptive statistics. The results on the determinants and the associated welfare effects of smallholder export participation are analyzed in Section 2.5, including sensitivity analysis. In the final section we discuss the implications and limitations of the findings. The two Appendices contain, respectively, additional tables and the findings from our qualitative field study.

2.2. Agriculture and Trade in Kyrgyzstan

Geographic characteristics largely determine Kyrgyzstan's domestic and international trade patterns and the type of agriculture it undertakes. Kyrgyzstan is a mountainous and landlocked country; it shares common borders with China and the Central Asian countries Kazakhstan, Tajikistan and Uzbekistan.

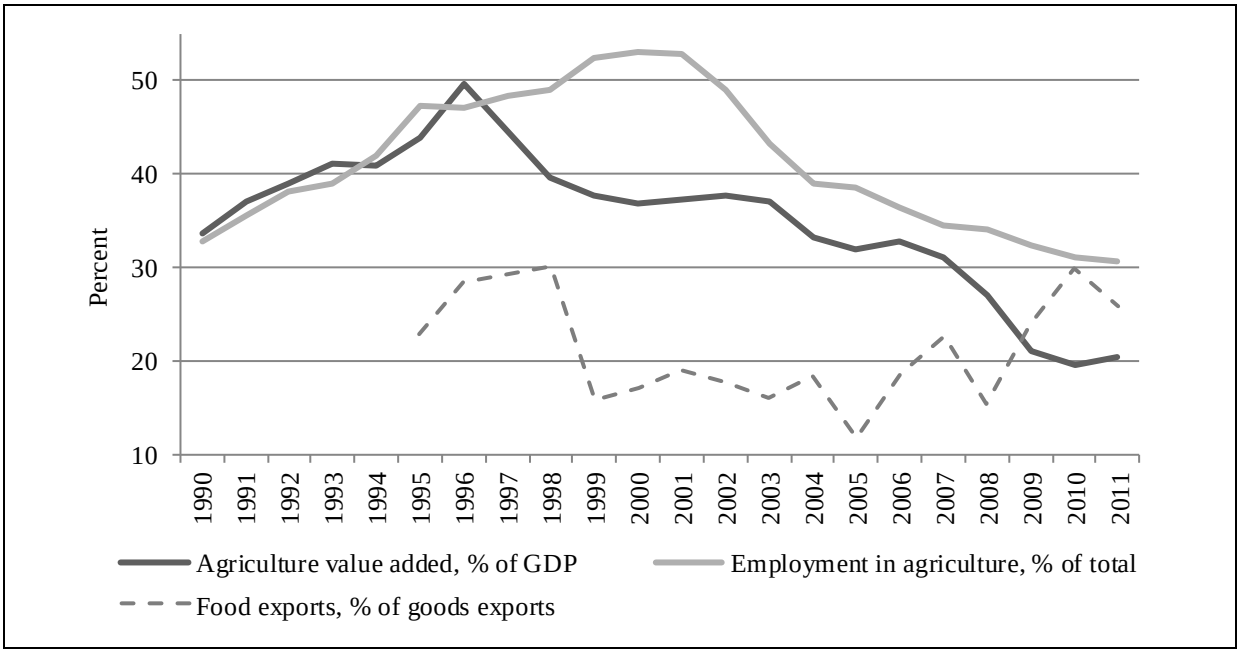
2.2.1. Agriculture

Agriculture in Kyrgyzstan played an important role for rural livelihoods and employment in the two decades of the transition. While the contribution of agriculture to GDP has declined from about 50 percent in mid-1990s to 20 percent in 2011, it remains an important sector from an employment perspective as it provides jobs to about a third of total employed (Figure

2.1). Agriculture is the dominate sector for the rural population, which accounts for about two-thirds of the total population.[8]

The agricultural sector underwent fundamental changes after the dissolution of the Soviet Union. In particular, Kyrgyzstan followed a radical approach in distributing most of the state-owned agricultural land to households, creating thousands of small-scale farmers (Akramov and Omuraliev, 2009; Lerman and Sedik, 2009). Moreover, land privatization in the 1990s was complemented by sizable urban-to-rural migration (Akramov and Omuraliev, 2009; Light, 2007). In 2010, 69 percent of the arable land was controlled by 319,000 peasant farms and about six percent by 734,000 household plots, whereby the average sizes of these family farms were 2.8 ha and 0.1 ha, respectively (Government of the Kyrgyz Republic cited in FAO/WFP (2010)).

Figure 2.1: Contribution of Agriculture to GDP, Employment, and Exports, 1990-2011



Sources: NSC(2012a), WDI(2013).

While peasant farms usually operate on family-owned land and are commercially oriented, the smaller household plots refer to household orchards or kitchen gardens and tend to be more oriented towards subsistence (Akramov and Omuraliev, 2009; FAO/WFP, 2010). In total, the smallholders produced more than 90 percent of the agricultural output in 2010. It is believed that the distribution of land in the early transition years helped to ease food security

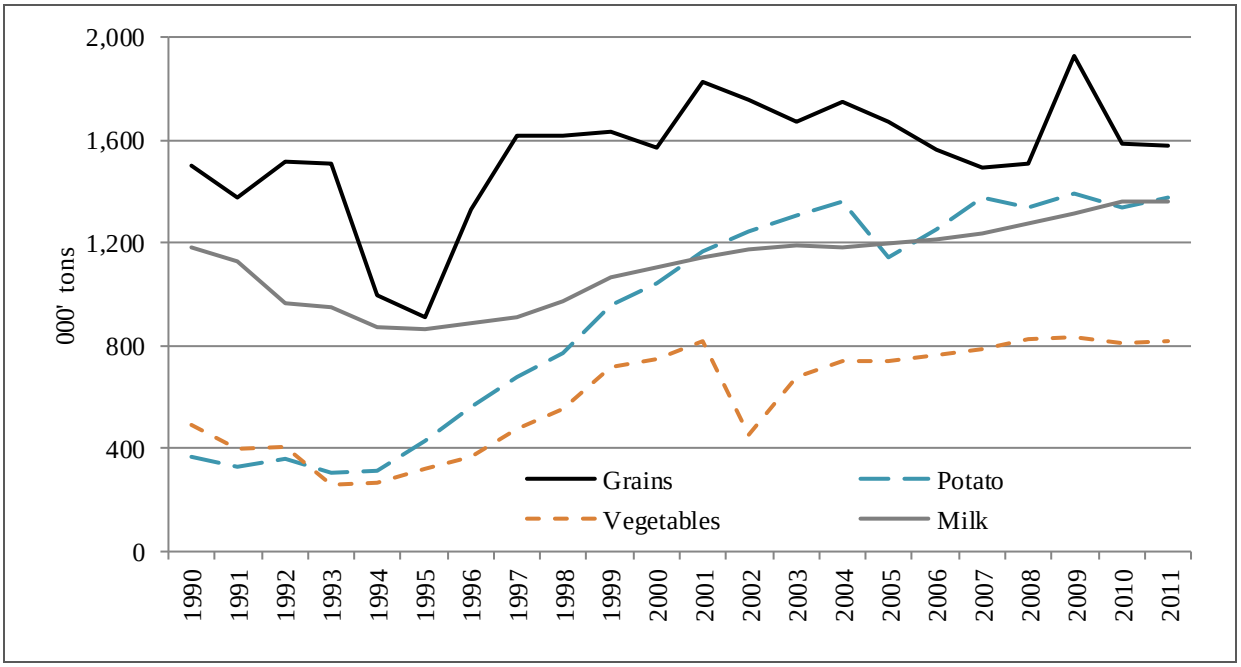
[8] Rural non-farm activities include education, health, trade, construction, transport and processing and account for about 40 percent of rural employment in 2006 (Atamanov and Van Den Berg, 2012b).

and unemployment issues; however, the recent years have seen a hot policy debate whether small-scale farming is conducive to productivity and efficiency (Government of the Kyrgyz Republic, 2012; Light, 2007).

Agricultural land makes up about 56 percent of Kyrgyzstan's total land area, while only seven percent of the total land is arable (WDI, 2013). The arable land and, thus, agricultural production is concentrated in the Chui valley in the north and the Fergana valley in the south, while the permanent pastures in the mountain regions are mainly used for livestock production (Christensen and Pomfret, 2008; FAO/WFP, 2010). Thereby, more than 82 percent of the cultivated land is under irrigation (FAO/WFP, 2010).

The main Kyrgyz agricultural products are grains, potato, vegetables, livestock and milk (Figure 2.2). Although wheat accounts for the most important staple grain in Kyrgyzstan, recent years have seen a decline in wheat production in favor of fodder crops, such as maize and barley (FAO/WFP, 2010). This latter development was in response to increased livestock, in particular sheep and goats, cattle, horses and poultry (FAO/WFP, 2010). In fact, the livestock sector accounts for approximately 50 percent of the agricultural value added (FAO/WFP, 2010).

Figure 2.2: Agricultural Production, 1990-2011

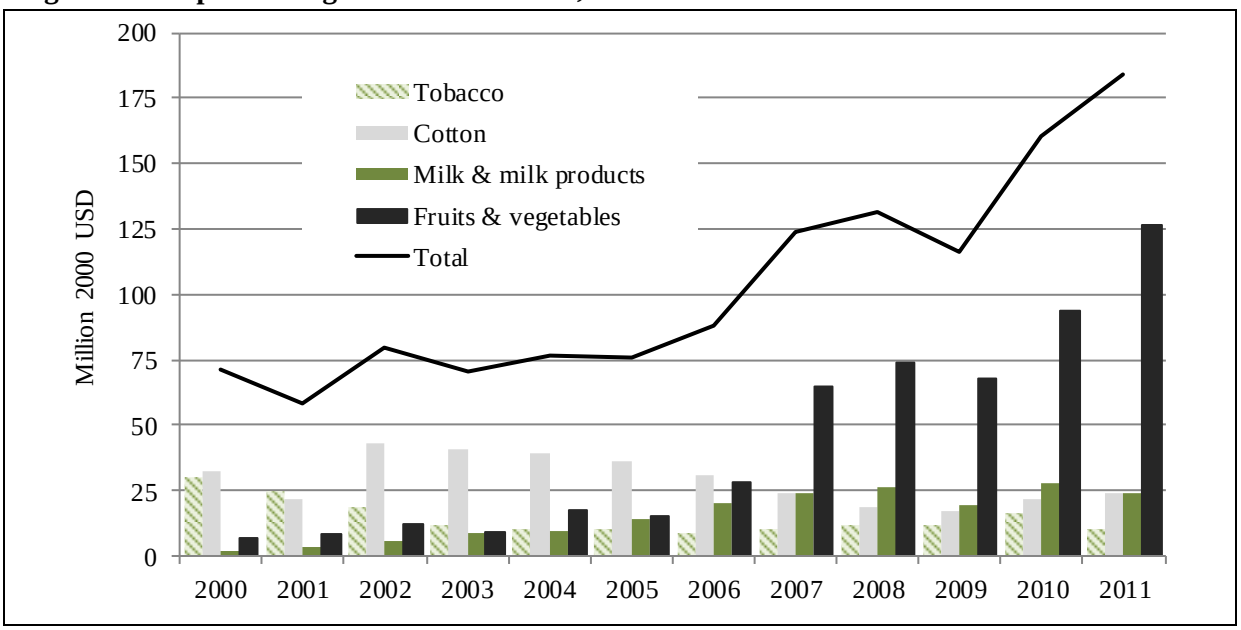


Source: NSC website (www.stat.kg), data from the years 1990-2011

2.2.2. Trade in Agriculture

Agricultural export in Kyrgyzstan represents a small share of total merchandise exports. About 8.3 percent of total exports were agricultural products in 2011 (NSC, 2012b). Kyrgyzstan's main agricultural export products are fruits, vegetables, milk, cotton and tobacco. Among these products, fruits and vegetable exports have increased remarkably since 2006 (Figure 2.3). The main export destinations for agricultural products are Russia, Kazakhstan, Turkey, the European Union and China. According to FAO/WFP (2010), livestock, dairy products, vegetables and fruits exported to Kazakhstan and Russia are mainly transported via the Kazakh border, while seasonal exports of vegetables and livestock are mainly routed via Uzbekistan. Thereby, the cities of Bishkek and Osh are central nodes not only for the domestic market but also the international distribution network.[9]

Figure 2.3: Exports of Agricultural Products, 2000-2011



Source: NSC and WDI (2011).
The data from NSC in million current US dollars (USD) has been deflated by the consumer price index for the United States obtained from BLS (2013).

Although agriculture represents a notable share of the Kyrgyz economy, the country imports a substantial amount of food products. Kyrgyzstan particularly depends on imports of wheat, flour, cooking oil, and sugar. Imports of fuel, fertilizers and machinery are also vital for the functioning and productivity of the agricultural sector (FAO/WFP, 2010).

[9] Kyrgyz exports of agricultural products are mainly transported overland, in particular by road transport – which accounts for 97 percent of the goods shipped in Kyrgyzstan (MTK 2012).

Despite the liberal trade regimes and low import tariffs[10], Kyrgyzstan faces natural and administrative impediments to external trade. As the World Bank (2011) notes, they are not only associated with the country's geographic, infrastructural and institutional situation, but also with unfavorable conditions in its neighbouring countries. Being a landlocked country and located far from international ports means long distances to world markets and many borders to be crossed during land transport (Raballand, 2003). Moreover, both Kyrgyzstan and its Central Asian neighbours – through which Kyrgyzstan's exports transit – have inadequate transport networks, such as missing road links across borders, bad physical conditions of roads, a sparse railway network in Kyrgyzstan and different rail gauges between Central Asia and Iran as well as China. Furthermore, exporters have to make informal payments at borders and during transportation. For example, when transiting through Uzbekistan there are customs valuation problems, inefficiencies at border crossings, and other uncertainties (Kaminski and Mitra, 2012). All these impediments lead to high transportation costs within Kyrgyzstan, Central Asia and to distant exports markets. Finally, Kyrgyz exporters face high tariffs on agricultural products, for example, in Central Asia (Grafe et al., 2008) and China (World Bank, 2011).

In general, Kyrgyzstan is a very suitable country to explore this research topic for two important reasons. First, the sector is not regulated in terms of production of certain products and the farmers' decisions on crop cultivation – despite certain level of crop specialization between the regions - are mainly market driven.[11] Second, the trade regime in Kyrgyzstan is liberal and export activity - as a source of economic growth - is encouraged (Government of the Kyrgyz Republic, 2012; National Council for Sustainable Development of the Kyrgyz Republic, 2013). However, as described earlier, the customs clearance and other border crossing regulations both from the Kyrgyz side and neighbouring countries is a challenge for small-scaled unprocessed agricultural exports. For this reason, there is a large share of undeclared exports to neighbouring countries, as documented in Ibragimova et al. (2012) and Kaminski and Mitra (2012).

[10] Soon after independence in 1991, it undertook far-reaching unilateral trade liberalization. In 1996, it became a member of the Eurasian Economic Community, consisting of Belarus, Kazakhstan, Russia and, since 1999, Tajikistan. Moreover, it was the first transition country to accede to the WTO, in December 1998.

[11] In opposite, the neighboring countries of Uzbekistan and Tajikistan concentrate their efforts in the production of cotton and wheat, meaning that the farmers do not have full control of their production choice (Anderson and Swinnen, 2008).

2.3. Estimation Strategy

2.3.1. Determinants of Export Participation

In this section, we focus on the factors that determine whether smallholders in Kyrgyzstan sell their agricultural products for export rather than for domestic distribution. The reason is that exporters tend to face greater challenges than domestic sellers in terms of transport, market access and quality requirements (Section 2.2). Therefore, we hypothesize that the smallholders' participation decisions in the two markets are driven by different factors.

In order to estimate the determinants of smallholder participation in the export markets versus domestic markets, we specify a logit model of the form

$$p_i = \Pr(w_i \mid \mathbf{z_i}) = \frac{\exp(\mathbf{z_i}'\boldsymbol{\delta})}{1+\exp(\mathbf{z_i}'\boldsymbol{\delta})}, \text{ for all } i. \qquad (2.1)$$

Thereby, $\Pr(w_i|\mathbf{z_i})$ denotes the conditional probability of household i choosing the export activity, given a vector $\mathbf{z_i}$ of observed variables and with w_i being a binary variable indicating that household i falls into the export group if w_i=1 and into the domestic market group if w_i=0*;* $\boldsymbol{\delta}$ is a parameter vector associated with the vector $\mathbf{z_i}$. In the treatment effect literature, the conditional probability $\Pr(w_i|\mathbf{z_i})$ is termed the propensity score (Imbens, 2000), referred to as p_i. The vector $\mathbf{z_i}$ contains observed selection variables.

2.3.2. Welfare Effects

Our welfare analysis amounts to the estimation of treatment effects considering export market participants as a treatment group and domestic market participants – as a control group.[12] The fundamental problem in analyzing treatment effects is that only one outcome is observed for any study unit (Wooldridge, 2010). That is, for a household in the treatment group, only the outcome under that treatment is observed, not also the outcome under the control

[12] Note that we apply a broad definition of treatment where a treatment variable may refer to any binary explanatory variable and is not restricted to traditional treatments, like medical treatment or program participation (Wooldridge, 2010).

condition. Likewise, for any household in the control group, only the outcome under the control condition is observed and the outcome under the treatment is missing. To overcome this problem, average treatment effects (ATE) are estimated (Wooldridge, 2010).

Our focus is on comparison between export participation against the control condition of domestic market participation by calculating ATE. Thereby, we choose the set of ATEs that averages the differences in the mean outcomes in a given treatment group and those in the control group across the study units in both groups. In other words, ATE gives the expected treatment effect for a household that randomly drawn from the sub-sample of households comprising the treatment and control groups. Following Lechner (2001), the definitions are as follows:

$$\tau = E[y_1|w=1] - E[y_0|w=0], \tag{2.2}$$

where, τ is the ATE associated with the export participation versus domestic market participation; w is a binary treatment variable, with w=1 indicating export participation, and w=0, if otherwise. Moreover, y_1 refers to the outcome variable under the export participation and y_0 under the domestic market condition. All y_0, y_1, and w are random variables. A realization for household i is denoted y_{0i}, y_{1i}, and w_i.

One of the challenges in estimating treatment effects and drawing causal inference in an observational study as ours is to overcome potential selection bias. More precisely, households are not randomly assigned to the export participation, but might self-select into it based on expected household welfare - turning the treatment indicators into endogenous variables in any welfare regression. For cross-sectional data, there is a variety of methods that aim to correct for the selection bias and, thus, to arrive at consistent estimates of ATEs. In order to achieve consistency, however, most of the methods require that the treatment assignment is ignorable and that the overlap condition is fulfilled (Lechner, 2001; Wooldridge, 2010).[13] For the treatment assignment to be ignorable, it must hold that the

[13] A method not relying on the ignorability of treatment assignment to hold would be instrument-variable (IV) estimation (Wooldridge, 2010). However, we do not apply an IV approach since we are not aware of suitable instruments for the treatment variables.

observed outcomes and the treatment variables are independent (or at least mean independent) conditional on the observed covariates $\mathbf{x_i}$, i.e.[14]

$$E[y_{1i}|w_i,\mathbf{x_i}] = E[y_{1i}|\mathbf{x_i}], \text{ and } E[y_{0i}|w_i,\mathbf{x_i}] = E[y_{0i}|\mathbf{x_i}] \quad (2.3)$$

Further, the overlap condition is fulfilled if – for any realization of the observed covariates and for the treatment condition – there is a positive probability to see households in both the treatment and the control groups, i.e.

$$0 < P(w_i|\mathbf{x_i}) < 1, \quad (2.4)$$

However, the ignorability-of-treatment-assignment assumption is likely to be violated if there is unobserved heterogeneity, i.e. if the selection bias is not observable. Therefore, we follow the literature (Guo and Fraser, 2009) by obtaining and comparing the results using a variety of methods. These include regression on covariates, propensity-score matching, and the entropy balancing. These methods will be presented in turn. Thereby, the methodological overviews will draw largely on Guo and Fraser (2009) and (Wooldridge, 2010).

2.3.3. Regression on Covariates

The simplest method to correct for selection bias and to estimate average treatment effects is regression on covariates. Like all the methods used in this chapter, it assumes that the selection bias is caused by an endogeneity problem, but that there is no unobserved heterogeneity. The selection bias in the regression is controlled for by including a large set of covariates that are correlated with selection into treatment and/or the outcome variable (Wooldridge, 2010). The so-established regression equation is estimated by ordinary least squares (OLS). The regression equation we specify for all households *i* is given by

$$y_i = \alpha + w_i\tau + \mathbf{x_i}'\boldsymbol{\beta} + e_i. \quad (2.5)$$

That is, observed household welfare y_i is regressed on a constant α, the binary treatment variable w_i and a vector of explanatory variables $\mathbf{x_i}$. Thereby, the coefficients τ on the treatment variables will give us the average treatment effects and **ß** is a vector of parameters

[14] In the literature, the ignorable-treatment-assignment assumption is also called conditional independence assumption or unconfoundedness assumption.

associated with the explanatory variables. Moreover, e_i is an error term assumed to be independently and identically distributed with mean zero and variance σ_e, i.e. $e_i \sim \text{iid}(0,\sigma_e)$.

2.3.4. Propensity Score Matching

The method of propensity-score matching was developed by Rosenbaum and Rubin (1983) for a binary treatment. Its objective is to overcome the selection bias by pairing treatment and control units based on similarities in the conditional probabilities of receiving treatment, the so-called propensity scores. That is, by matching on propensity scores, differences in the observable characteristics between treated and control participants shall be balanced (Rosenbaum and Rubin, 1983). The procedure involves three steps. First, the propensity scores are estimated. Second, treated and control units are matched on the estimated propensity scores, leading to a new sample where the single covariates between the treatment and control groups follow nearly identical distributions (Guo and Fraser, 2009). Third, post-matching analysis is applied to the matched sample to estimate the ATE.

In our case, the procedure is analogous (Lechner, 2001). In the first step, we use the propensity score (Imbens, 2000) estimated by the logit model (2.1) above. The estimated propensity scores, $\hat{p}_i$, in turn, are the basis for the matching process undertaken in the second step. Thereby, the households falling in the group of export sellers are matched to households in the domestic market group. The matching is based on the commonly applied greedy-matching algorithms.[15] Thereby, our algorithm of choice is the single-nearest-neighbor matching (Imbens, 2004) with replacement (Dehejia and Wahba, 2002) on the common-support region (Becker and Ichino, 2002).[16] That is, for any sub-sample, the control household j to be matched to the treated household i is found by minimizing the absolute difference in the estimated propensity scores between i and all control households j, i.e.

$$\min_j \left\| \hat{p}_{i1} - \hat{p}_{j0} \right\| \tag{2.6}$$

[15] For an overview of the greedy-matching algorithms as well as other matching procedures, see Guo and Fraser (2009).

[16] The matching is done with the help of the user-written Stata program *psmatch2* developed by Leuven and Sianesi (2003).

Moreover, matching with replacement means that a control household *j*, can be used as a match more than once. We choose this option as it is associated with higher-quality matches (Abadie and Imbens, 2006). Finally, matching on the common-support region uses only households *i* and *j* that lie in the range where the estimated propensity scores of the treatment and control groups overlap[17].

Multivariate analysis can be applied to the total matched sample as done with randomized experiments (Guo and Fraser, 2009). The multivariate analysis we conduct in the third step to estimate the ATE of export participation is based on the regression equation given in (2.5), which is estimated by the maximum-likelihood (ML) method. That is, the error term e_i is now assumed to be normally distributed with mean zero and variance σ_e, i.e. $e_i \sim N(0,\sigma_e)$.

2.3.5. Entropy Balancing

Finally, we use the entropy balancing method as developed by Heinmueller (2012). This method fits well to this study as it deals with studies with a binary treatment. Similar to the matching methods, entropy balancing is a data pre-processing procedure that allows for the reweighting a dataset. The pre-processing is based on a maximum entropy reweighting scheme that assigns weights to each data unit such that the covariate distributions in the reweighted data satisfy a set of moment conditions set by a researcher. It reweights the control group data in order to match the covariate moments in the treatment group. This method directly tackles the fundamental challenge of observing only the outcome values of the treatment group under the treatment condition and those of the control group under the control condition. More precisely, it matches the treated and control units with the objective to impute the missing outcome values for the treated units under the control condition and for the control units under the treatment condition. Based on the matched sample with the imputed outcome values, average treatment effects are then simply calculated as mean outcome differences.[18]

[17] In the Appendix we contrast the matching quality of the single nearest neighbor method to the kernel matching. The kernel-based matching – a non-parametric method - uses propensity scores differentially to calculate a weighted mean of counterfactuals.

[18] The estimation is performed with the help of the user-written Stata program *ebalance* developed by Heinmueller and Xu (2012), downloaded from http://fmwww.bc.edu/RePEc/bocode/e on 15 March 2013.

2.4. Data

Our analysis is mainly based on the second wave of the "Life in Kyrgyzstan" (LiK) panel survey, collected in 2011. This survey was incepted in 2010 and conducted annually over the period 2010-2012 by the German Institute for Economic Research (DIW Berlin) in collaboration with the American University in Central Asia, Humboldt University in Berlin, and CASE-Kyrgyzstan Economic and Social Research Center (details on the sampling and questions of the survey can be found in Brück et al., 2013). Data collection of the second wave took place between September and November 2011. The survey covered 2862 households (1168 urban, 1694 rural), representative at the national, rural/urban and north/south levels.

The LiK survey collects information on individual, household and community levels. This study exploits a rich set of individual, household and community characteristics, as well as some lagged variables from the first wave of the LiK survey conducted in 2010. The section on agricultural markets contains information on farm household's sales activity, on its export participation and on quality-related aspects of agricultural production.[19] The questions on agricultural markets relate to the last cultivation season for crops and the six-month period before the survey for livestock; household income and expenditure questions refer to the 12 months prior to the interview. Ownership of assets is recorded at the time of the interviews. On individual level we use information about household head's background, such as age, gender, and ethnicity. At the household level, besides welfare indicators, we exploit a rich set of variables pertaining to household demographics, employment, assets ownership, and location.

2.4.1. Domestic Market and Export Groups

In our analysis we focus on a sub-sample of rural households that are active in agriculture and sell their products either in domestic or export markets. As a rule, the market participating households have one or more adult members employed primarily in agriculture. These

[19] No other household survey for Kyrgyzstan contains any questions on quality aspects of production, in particular not the Kyrgyz Integrated Household Survey (KIHS) which has detailed information on agricultural production of households.

members can either be employers, own-account workers, members of producers' cooperatives, or contributing family workers. We exclude households with wage employees in agriculture as these households deviate from the definition of smallholders given they do not use own resources to generate income.

In order to comply with the notion of smallholding farms we exclude households operating large sized farms. There are several definitions of smallholders that are based on land size, dependence of family members as labor resource, or dependence on farm income. We adopt the FAO approach and define as smallholders those farm households that operate with no more than 10 hectares of land.[20] In most studies the land size of smallholders is defined less than two hectares; however, in case of Kyrgyzstan many households from northern regions own more than two hectares of land.

A household is categorized as a domestic-market participant (domestic) if it sells its main market product mainly within Kyrgyzstan.[21] Correspondingly, it is defined as an export participant (export) if it sells the main share of its key product for export. The export group includes households that: 1) directly sell their goods abroad; 2) sell to an intermediary who exports the goods; and 3) sell products domestically, but know that the products are eventually exported. That is, we do not only include direct exports, but also capture the entire value chain. As we learned from our qualitative research, the third category of export participants may be underreported as households sometime do not know that the goods they sold domestically are later exported (see also the questions of the agricultural module of LiK 2011 in Table 2.6 in Appendix). Largely, the export market households in this study are those who participate in the initial transaction of an export operation chain. Therefore, we imply that the export participants may benefit from higher prices expected from the export operation compared to participants in domestic markets.

Out of the total 1,693 rural households in LiK 2011, 907 households (or 54 percent) were involved in some agricultural activity. After excluding the households that: 1) do not participate in markets (146 households); 2) are active in agriculture only as wage employees (15 households); 3) operate with land size over 10 hectares (11 households); possess no land for agricultural purposes (2 households); or report zero or unreasonably high agricultural

[20] A discussion on definition of a smallholder can be found at www.fao.org/docrep/007/y5784e/y5784e02.htm.
[21] A detailed description of the variables used throughout the paper can be found in the Appendix.

income (22 households), the final sub-sample consists of 711 households (Table 2.1). Domestic market participants account for two-thirds of this sample and the export participating households – for one-third. The distribution of households across oblasts accurately represents the regional population distribution: more than half of the households originate from South oblasts. We observe a high share of export participants in Batken among South oblasts and in Talas – among North oblasts.

Table 2.1: Sample of Farm Households Engaged in Domestic and Export Markets

	Total households	of which, participate in ..	
		domestic market *(domestic)*	export market *(export)*
Total	711	477	234
% to total	*100*	*67*	*33*
North	298	189	109
Issyk-Kul	113	89	24
Naryn	22	19	3
Talas	77	8	69
Chui	86	73	13
South	413	288	125
Djalal-Abad	106	84	22
Batken	83	41	42
Osh	224	163	61

Source: LiK 2011

2.4.2. Conditioning Variables

The literature employs a number of conditioning variables that largely relate to household characteristics and resources as well as to market prices and public services. For example, Boughton et al. (2007) exploits a structural model in which market participation depends on household characteristics, household assets, public-good provision and prices of the marketed goods. We adopt their conceptual framework and expand the selection of conditioning variables using a number of additional individual, household, and community characteristics (relating to variables $\mathbf{z_i}$ in Equation (2.1) or $\mathbf{x_i}$ in Equation (2.5)).[22] Broadly, we distinguish

[22] However, we do not include any price information since our analysis is based on a cross-section of households and, thus, difficulties would arise in identifying price responsiveness (Heltberg and Tarp, 2002).

household head characteristics, household demographics, assets, products, shocks, and location.

Household head characteristics include age, gender, ethnicity (Kyrgyz, Uzbek, and other), internal migration background, and risk taking attitudes.

Household demographics comprise of household size, average years of schooling of adult household members, number of members working in agriculture and non-farm sectors, and number of labor migrants working abroad. When counting household size, we excluded students and labor migrants who were not present at home at the time of data collection.

Household assets include land, both owned and rented, that a household uses for agricultural activity; share of irrigated land; number of cars owned; and livestock stock, expressed in sheep equivalent units. They account for differences in household dependence on agriculture and the availability of non-farm activities.

Products are categorized into five groups: 1) cotton and tobacco; 2) grains, including wheat; 3) potatoes; 4) fruits and vegetables; and 5) other products, including livestock and related by-products such as milk. Cotton and tobacco are predominantly exported products, so one of the sensitivity checks we conduct is to exclude the households that produce highly exportable products. We also include here the number of quality requirements a household fulfils. In total, a list of seven quality requirements is asked from households, ranging from packaging requirements to use of pesticides.

Shocks included in the analysis are those that affect agricultural activity or family structure. Agricultural shocks include those that presumably alter production or productivity, such as frosts, droughts or diseases. Family shocks are called to control for illness or loss of working members, as well as for family separations.

Household location captures geographical, agro-climatic and infrastructure differences. These are particularly relevant for Kyrgyzstan since transport systems are weak and distances to borders are long and because agro-climatic conditions greatly differ between regions. We do not control for oblasts directly, but we do control for South and North delineation. The distance to the nearest road and the market are called to control for easiness of physical market access, while the distance to the next international border is called to control for

propensity to export. Similarly, population of the community is a proxy for higher probability to sell domestically, while altitude helps to control for agro-climatic conditions.

Lagged variables, interaction and higher order terms are used in deriving propensity scores as well as in welfare effect analysis. Lagged variables on assets and labor are used to address the endogeneity of the participation and welfare effects (descriptive of lagged variables are presented in Table 2.11 in Appendix). In order to account for non-linear effects, we include squared terms of the variables age, household size, and education. Additionally, we include interaction terms between the ethnicity, exportable products, and regional variables.

The descriptive statistics presented in Table 2.2 gives first impression of the differences in the household characteristics between the two groups of households.[23] The columns '*Domestic*' and '*Export*' represent means of the variables, respectively, for market and export participant households. The significant differences in the characteristics indicate that the households are not randomly distributed across the groups, making it important to control for selection into export when we estimate average treatment effects.

Household head characteristics differ in terms of ethnicity, migration status and risk attitudes. Household heads do not differ much in terms of age or gender. Uzbek headed households make about one fifth of all exporting households, while only about eight percent in the domestic market group. Internal migration status differences are also prominent with more migrated household heads presented in the domestic group. Both groups represent neutral risk attitudes, although household heads in the export group seem to be relatively more willing to take risks.

Household demographics differences between the two groups are mainly associated with labor allocation. They do not seem to differ much in terms of household size and educational capital, although, as expected, exporting households have a larger number of adult members working in agriculture and fewer in non-farm sectors. They also have a higher number of members who are labor migrants abroad. This fact is likely coming from the fact that both exportable products and labor migration originate from South oblasts of Kyrgyzstan.

The two groups have important differences in land characteristics. Households in the export group operate on smaller plots of land, though most of the land they own is irrigated – an

[23] The description of the variables can be found in Table 2.9 in Appendix 2.1.

important factor for crop cultivating decisions. Both types of households have equal size of livestock – another important factor for livelihoods of rural households as livestock serves as a saving instrument and a source of food. Ownership of transport means is very low in both groups, though domestic group participants seem to be in a slightly advantaged position.

Table 2.2: Descriptive Statistics of the Conditioning Variables

	Total	Domestic	Export	*Difference*	
HH head characteristics					
Age, years	52.4	52.8	51.5	*-1.3*	
Female, share	0.13	0.14	0.10	*-0.04*	
Kyrgyz, share	0.78	0.79	0.75	*-0.04*	
Uzbek, share	0.11	0.08	0.18	*0.11*	***
Other ethnicity, share	0.11	0.13	0.06	*-0.06*	***
Migrated within country, share	0.04	0.06	0.01	*-0.05*	***
Risk attitude, *in a scale [0-10]*	5.0	4.7	5.4	*0.7*	***
Household demographics					
Household size	5.5	5.6	5.3	*-0.3*	**
Years of schooling of adults	10.8	10.8	10.8	*0.0*	
Members working in agriculture	1.72	1.59	1.97	*0.37*	***
Members working in other sectors	0.50	0.55	0.41	*-0.14*	**
Number of migrants abroad	0.24	0.20	0.33	*0.14*	***
Household assets					
Operational AG land, ha	1.48	1.55	1.34	*-0.21*	**
Irrigated land, share	0.89	0.86	0.96	*0.10*	***
Number of cars owned	0.41	0.43	0.36	*-0.06*	
Livestock, sheep equivalent unit	25.0	25.0	25.1	*0.1*	
Products					
Cotton and tobacco	0.15	0.07	0.31	*0.24*	***
Grains	0.25	0.27	0.19	*-0.09*	**
Potato	0.34	0.38	0.26	*-0.12*	***
Fruits and vegetables	0.15	0.13	0.20	*0.07*	**
Livestock and other products	0.11	0.14	0.04	*-0.10*	***
No. of quality requirements fulfilled	1.59	1.37	2.03	*0.65*	***
Shocks					
Agriculture related shocks, share	0.77	0.75	0.81	*0.06*	*
Family shocks, share	0.10	0.12	0.06	*-0.06*	***
Location					
South oblast	0.58	0.60	0.53	*-0.07*	*
Distance to a major road, km	1.3	1.0	1.8	*0.8*	***
Distance to next market, km	7.9	7.4	8.9	*1.5*	**
Population of the community, '000	5.4	5.0	6.4	*1.4*	***
Distance to next country border, km	84	85	81	*-4*	***
Altitude, in km above sea level	1.3	1.4	1.2	*-0.2*	***

Source: LiK (2011)

The means for domestic market participants (*domestic*) are compared to export participants (*export*) using t-tests. Significant differences are indicated by * p<0.1, ** p<0.05, *** p<0.01.

The distributional pattern of products between the domestic and export groups is consistent with the expectations. Certain products, such as cotton and tobacco, are highly likely to be exported, and, thus, we observe a higher prevalence of these products in the export group. Importantly, and as expected, a higher share of exporting smallholders fulfils quality requirements and the difference is quite large. Agricultural shocks seem to affect equally frequently both types of households, though a little more – the export group. Family related shocks are more prevalent in the domestic market group.

Location variables demonstrate a mixed picture, sometime counterintuitive. For example, households in export groups seem to be located in almost the same distance to international borders as the ones in domestic group; they are also a bit far from the roads and markets. In terms of altitude, export group is located in a lower terrain, and it is expected as some products (for example, cotton) can be grown in higher temperature areas.

This description of differences in conditionings variables between domestic and export households gives a glimpse of the factors that play important role in determinants and welfare effects.

2.4.3. Outcome Variables

We use four alternative outcome variables referring to household welfare: monthly agricultural income, total household income, consumption expenditure, and asset index (based on ownership of durable goods). This approach is useful to understand how export participation affects various measures of household welfare, both for short-term (income and consumption) and long-term (assets) horizons.

The first welfare indicator is household income from agriculture over the last 12 months, including sales and other revenues. While this variable is most suitable for this study to assess the welfare gains from participation in export markets, we cautiously interpret this indicator as it mostly reflects the gross revenues and does not take into account the implicit income from consumption of self-produced food products.

The second welfare variable is total household income - mainly used welfare indicator in the studies mentioned in the literature review. In addition to agricultural income, total income

represents all items reported by a household, including wages, pensions, property income, public and private transfers in the last 12 months.

Since income data obtained from household surveys might be plagued with measurement error (Deaton, 1997), we use household consumption expenditures as a third welfare indicator. The consumption aggregate is composed of food expenses and purchase of recurrent non-food goods and payments to regular services. Food consumption includes the expenses for purchased products as well as value of consumed own produced food. The non-food component includes regular expenses for goods and services (such as clothing, shoes, toiletry, small household items and educational, transport, communication services). We do not account for the use of durables and housing.

Finally, we control for a more stable household welfare indicator based on assets ownership. For this, we construct an asset index using the first principal component analysis based on information on 13 durable assets ownership.[24] The logic behind the chosen items is that households would purchase these assets to improve the standards of living as their incomes increase. This means that we include neither productive assets, such as land, livestock or agricultural machinery. In addition, we exclude assets with very low or high ownership frequencies as those items do not affect the variability of the index.[25] The resulted asset index has a mean zero and standard deviation equal one. For easy interpretation of the results, we transform the asset index numbers so that the mean is equal to 100.

The two groups of households - domestic and export market participants - do not differ largely in their aggregate income, consumption expenditure, and assets, but they differ in agricultural income (Table 2.3). In fact, a higher agricultural income in the export group is expected given they devote more labor resources to agriculture and may sell their products for higher prices compared to those who sell their products domestically. When we look at total household income, the positive gap remains, although it is no longer significant. This advantage in household income does not seem to translate into higher consumption or durable assets possession. In contrast, the exporting households have a slightly lower level of

[24] These durables are car, fridge, electric stove, microwave, sewing machine, vacuum cleaner, bed, kitchen furniture, music and DVD player, satellite dish, and cell phone.

[25] For example, radio and TVs are owned by almost all households, while very few own computers or digital cameras.

consumption expenditures and assets ownership compared to the domestic market households; the difference is not economically significant, though.

The fact that households report much higher aggregate incomes than total consumption, despite its logical fit, is somewhat puzzling[26]. It is believed that households in low-income developing countries underreport and underestimate income compared to consumption expenditure data (Deaton, 1997). This convention follows from the fact that large part of these economies operate in informal setting with high level of self-subsistence among rural households, and, therefore, measuring irregular and mostly non-monetary incomes and benefits is problematic. In contrast, consumption expenditures, when measured regularly and rigorously, represent a better welfare indicator, as households more openly provide information about their expenses for food and regular non-food goods and services.

Table 2.3: Smallholder Welfare

Soms per month, if not indicated otherwise

	Total	Domestic	Export	Difference
Agricultural income	7,055	6,356	8,480	2,124***
Household income	15,332	15,019	15,969	950
Household consumption	9,313	9,438	9,059	-378
Asset index, *mean is 100*	100.0	104.0	91.9	-12.1

Source: LiK (2011)

The significant differences using t-tests are indicated by * p<0.1, ** p<0.05, *** p<0.01.

We provide three possible reasons why there is a large gap between the consumption and income data. First, both welfare measures have some chance of measurement errors due to the recall nature of information. The LiK survey collects the data annually for the previous 12 months, and there a high chance of underreporting or even over-reporting by rural households, as the data collection period (October and November) overlaps with one of the peaks in the income and expenditures cycle, such sale of harvested crops (in income) and school expenses (in consumption). Thus, it is highly likely that the agricultural income reporting is based on the recent sales. Second, agricultural income data may represent the revenues, not net profit. This issue is acceptable as soon as all agricultural households report similarly. Third, while the possible income sources are covered well in the survey, the

[26] In addition, we compared the aggregate household income with the total household expenditure and still find a sizable gap. Expenditure aggregate – in addition to the consumption items – includes non-regular and bulky expenses for non-food goods and services. We do not have enough information to assume that the difference between income and expenditures are directed towards savings.

consumption data cover only important items. For comparison, LiK collects data on food expenses based on 38 items, while KIHS comprises of about 170 items (Esenaliev et al., 2011).

Given that the LiK survey collects income and consumption information once per year for the previous 12 months and covers relatively small, though very important, number of expenditure items, we provide comparison of welfare indicators using the Kyrgyz Integrated Household Survey (KIHS). This household survey, conducted by NSC, collects very detailed consumption data and the households are visited on a quarterly basis (Esenaliev et al., 2011). We conducted comparison analysis of the key household characteristics, income and consumption data using KIHS and LiK for 2011. We restrict the comparison to all rural households (not only smallholders) in both datasets and distinguish between North and South oblasts (see Table 2.10 in Appendix 2.1). When we look at the basic characteristics of households, such as household size and landholdings, we find that households in LiK are larger by almost one person[27]; we find relatively comparable land size. Regarding the welfare indicators, we find, at first, that the rural households in LiK dataset report much higher aggregate and per capita income than the households in KIHS. Secondly, we find that households in KIHS report higher food expenditures, which is expected given that it collects much more detailed data on food items. Finally, we find a surprisingly small, statistically indistinguishable, deviation in total consumption of rural households in the two datasets[28]; however, the differences emerge when we consider North and South oblasts separately. The fact that consumption data both from LiK and KIHS have low deviation compared to income data, does not mean that the consumption aggregate is a more reliable welfare indicator compared to income data.

[27] We associate this difference with the stricter rule applied by NSC in calculating household size, based on factual time the members lived in household during the 12 months. In LiK survey we exclude only labor migrants abroad and students.

[28] We exclude use of durables and the food eaten out from the KIHS based consumption aggregate for a better comparability. However, we note that the composition of the consumption is necessarily different in the two surveys given the varying details of the data collected.

2.5. Results

2.5.1. Determinants of Smallholder Export Participation

To investigate the determinants of export participation, we run a logit model as in Equation (2.1) to calculate the propensity to participate in export markets. We use the selection of the conditioning variables discussed in the previous section. However, in order to address potential endogeneity issues, we use lagged, 2010, variables on land, productive assets, livestock, and labor allocation. We also include squared terms for age, education, household size, and altitude. We use interaction terms of the exportable products with the Uzbek household head and of the migration affected households with south region.

In Table 2.4, we display the average marginal effects for the export participation.[29] In general, we find important positive determinants to be the specialization in agriculture and production of export-oriented products. Thus, a higher number of members working in agriculture and cultivation of cotton, tobacco, grains, fruits and vegetables raise the probability of export participation. The fact that agricultural shocks and longer distances to markets are associated with positive propensity to export is puzzling. The negative determinants include minority ethnicity and internal migration status of a household head, as well as residence in South oblasts. We do not find any effect from fulfilment of quality requirements and asset ownership, such as land, livestock or equipment. A higher number of fulfilled quality requirements does not statistically increase the probability of export participation.

The choice of this set of conditioning variables is driven not only by motivation to achieve a higher precision in propensity to export participation, but also with the necessity to achieve a balanced model that allows reasonable common support in probability to fall into the export or domestic group. Another consideration is to avoid multi-collinearity issues as many variables potentially carry similar information. This is why oblast dummies, as well as other locational characteristics, are not included.

[29] We have chosen not to calculate marginal effects at the mean because our estimates use numerous dummy variables.

Table 2.4: Average Marginal Effects

	Marginal effect	*S.E.*		Marginal effect	*S.E.*
HH head characteristics			**Products**		
Age	0.00	*0.00*	Cotton and tobacco	0.55	*0.08****
Female	-0.03	*0.05*	Grains	0.15	*0.10*
Uzbek	-0.05	*0.09*	Potato	0.15	*0.06***
Other ethnicity	-0.25	*0.08****	Fruits and vegetables	0.39	*0.10****
Migrated within country	-0.28	*0.06****	Quality requirements, 2010	0.00	*0.02*
Risk taking attitude	0.00	*0.01*	**Shocks**		
Household demographics			Agriculture shocks	0.10	*0.07*
Household size	-0.01	*0.01*	Family shocks	-0.11	*0.06**
Years of schooling of adults	-0.01	*0.01*	**Location**		
Workers in agriculture, 2010	0.04	*0.02***	South oblast	0.02	*0.01***
Workers in non-AG, 2010	-0.02	*0.03*	Distance to a major road	0.00	*0.00*
Migrants abroad	-0.03	*0.03*	Distance to next market	0.00	*0.00*
Household assets			Population	0.00	*0.00*
Operational AG land, 2010	-0.01	*0.00*	Distance to next border	0.00	*0.00*
Irrigated land, 2010	0.22	*0.12**	Altitude above sea level	-0.32	*0.09****
Number of cars owned, 2010	0.01	*0.05*			
Livestock units, 2010	0.00	*0.00*			

Sources: LiK 2010 and 2011

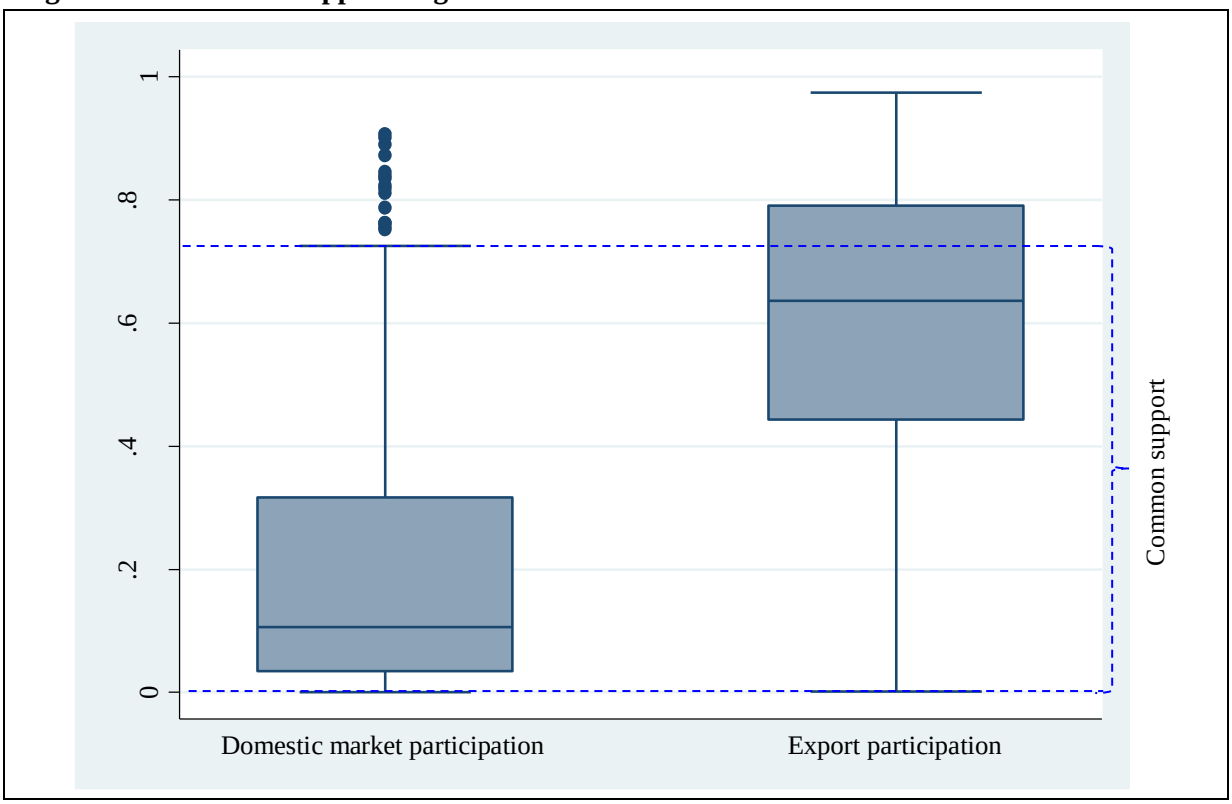
Significant estimates are indicated by * p<0.1, ** p<0.05, *** p<0.01. The calculation of the average marginal effects includes squared terms of the variables that pertain to age, education, household size, altitude as well as interaction terms between the Uzbek ethnicity and exportable products and between migration-affected households and South dummy. The finite-difference method is used for all dummy variables. Standard errors correct for cluster effects at the primary sampling unit level. The variables descriptions can be found in Appendix.

The chosen model provides a good overlap in common support region of the propensity scores, as illustrated in Figure 2.4. However, when we compare the means in conditioning variables using the matched sub-sample based on propensity score and raw sample, the differences in characteristics still remain. As illustrated in Table 2.12, the propensity score based matching method reduces the bias in the means between the domestic and export groups on average by a factor of 3.5, but it fails to achieve good matching quality in each variable – measured by the standardized bias for each individual. In some cases the standardized bias - in opposite - increased somewhat. This result is illustrative of the difficulties in matching methods that require a careful but meaningful selection of a set of conditioning variables that allow obtaining balanced propensity scores across the two comparison groups with sufficient overlapping common support. This task becomes more problematic with the small sample size, as is the case in our study. The described set of conditioning variables presents our best set of variables - among other versions - that allows

good common support overlap in the propensity scores between the domestic and export groups.

In contrast, entropy balancing allows achieving the highest matching quality, as evidenced in the standardized bias equalled to zero in all individual conditioning variables. That is the reason that we take the entropy balancing based estimates as our preferred estimates in the welfare analysis, presented in the following section.

Figure 2.4: Common-Support Region



Source: Own estimations based on LiK 2011

2.5.2. Welfare Effects of Smallholder Export Participation

In the welfare effects analysis we are interested in whether smallholders derive greater welfare from export sales compared to domestic market sales. Our hypothesis is that export sales activities have a stronger positive impact on household welfare compared to domestic market participation, assuming that smallholders earn higher margins in export markets. As discussed in the previous sections, we use four welfare indicators and exploit three approaches in calculating welfare effects.

Our hypothesis on welfare gains from export sales is confirmed in a limited extent. As summarized in Table 2.5, the positive average treatment effects for smallholder export participation hold only for agricultural income, while there is no statistically meaningful difference in aggregated household income, consumption or assets. This result generally holds for all estimations based on the three methods described above. The results for the regression controlling for covariates and the regression using the matched households based on the common support in propensity scores are consistent for all welfare indicators. The estimates based on entropy balancing, which we take as our preferred method, demonstrate smaller effects for both income indicators.

Table 2.5: Average Treatment Effects

Soms per month, if not indicated otherwise

Increase in welfare if a HH participates in export	Mean difference	Regression on covariates	Propensity score matching	Entropy balancing *(main specification)*
AG income	2,123.89***	2,845.36***	2,820.92***	1,762.36**
R^2		*0.17*	*0.17*	*0.26*
Income	949.9	1,588.0	1,426.4	368.6
R^2		*0.22*	*0.22*	*0.25*
Consumption	-378.4	-569.5	-579.0	-1,033.3
R^2		*0.22*	*0.22*	*0.32*
Asset index, mean=100	-12.1	-2.0	-2.2	-8.0
R^2		*0.31*	*0.31*	*0.36*
N		*704*	*687*	*704*

Sources: LiK 2010 and 2011

The gain in agricultural income the exporting households obtain is relatively moderate. On average, an increase in agricultural income for 1,762 Soms translates into 23 percent higher incomes per agricultural worker compared to the average per worker wages in the domestic group. However, the size of average household incomes per worker (about 4,110 Soms) is much smaller than average wage in Kyrgyzstan in 2011, which was equal to about 7,500 Soms.[30]

Turning to a more detailed analysis of the income effects along with the confounding variables, we only look at the regression results obtained using entropy balancing (Table 2.6). These confounding factors relate to both types of households. Across all welfare indicators, some variables show consistent effects. These variables are female household headship,

[30] The average national wage presented excludes Bishkek, where the wages are particularly high. The average national wages are collected from formal enterprises and companies, and thus, do not represent wages in informal sectors.

ownership of cars and livestock. Specifically, female-headed smallholder households have on average lower income and assets, but not significantly lower consumption. Ownership of cars and livestock is positively and economically associated with the higher welfare levels in most indicators.

Table 2.6: Detailed Welfare Analysis

Increase in welfare if a HH participates in export markets	Agricultural income, *Soms/month*	Income, *Soms/month*	Consumption, *Soms/month*	Asset index, *100=mean*
Export participation	1,762.36**	368.57	-1,033.33	-8.01
HH head characteristics				
Age	30.37	163.74***	19.07	1.39***
Female	-2,283.14***	-4,460.32***	-774.74	-33.07*
Uzbek	322.34	5,350.87*	1,236.32	29.51
Other ethnicity	831.59	1,526.10	-1,595.03	59.58**
Household demographics				
Household size	152.38	988.68**	959.48***	2.99
Years of schooling of adults	1.12	919.42**	148.06	11.20***
Workers in agriculture in 2010	689.86*	751.25	-129.84	3.53
Workers in other sectors in 2010	477.04	2,593.85***	714.07	19.09
Number of migrants abroad	245.53	314.02	-94.10	8.24
Household assets				
Operational AG land, 2010	-23.53	66.15	-5.66	1.92*
Irrigated land	-2,605.11	-2,679.20	931.56	-16.12
Number of cars owned, 2010	1,368.76	3,402.51**	1,959.70***	50.50***
Livestock units, 2010	61.89***	63.17***	9.44	0.29
Products				
Cotton and tobacco	-774.01	-3,394.93	-547.51	-70.69**
Grains	-1,191.94	-1,375.71	-1,816.84	-23.73
Potato	458.15	-1,049.87	-1,935.72*	-29.28
Fruits and vegetables	781.62	499.04	156.47	-67.75**
No. of quality requirements	107.19	370.38	338.76*	5.35
Shocks				
Agriculture related shocks	-765.28	-159.47	1,285.07	7.85
Family shocks	-1,007.01	-1,300.13	-408.48	-19.97
Location				
Distance to a major road	381.03***	219.78	-43.19	-2.06
Distance to next market	-65.21	-93.69	45.80	1.64*
Altitude	-1.58	-2.57*	-2.44**	-0.01
South oblast	-1,620.89	2,494.66	-1,255.77	-26.78
Constant	7,203.38*	-7,660.85	3,238.49	-94.87
R^2	0.26	0.25	0.32	0.36
N	704	704	703	704

Sources: LiK 2010 and 2011

The regression results are based on weights obtained by entropy balancing method. Standard errors are corrected for cluster effects at the primary sampling units. Significant estimates are indicated by * p<0.1, ** p<0.05, *** p<0.01.

Other important confounding variables that have positive and statistically significant effects- although not consistent across welfare indicators - include age of household head, education of household members, and land size. Among the negative factors we note importance of some types of products, altitude and location in South oblasts. We note that the adherence to quality requirements has, at best, a marginal positive effect. The sign of the quality requirement variable is consistently positive across the welfare indicator.

2.5.3. Sensitivity Analysis of Welfare Effects

One sensitivity check we conduct is to exclude the exportable products, such as cotton, tobacco, and kidney beans. These crops are mainly targeted for export by cultivating households and thus the participation in export markets is highly likely. By excluding these products, we would like to see whether the welfare effects change when there is a choice to sell products domestically or for export.

The number of excluded households that export cotton, tobacco, and kidney beans is 133, and thus, our sample size reduces to 578 households. Given that we drop mostly the exporting households, the share of the export group declines to 23 percent. After running the same set of estimation steps, we largely find not much difference from our main results. In terms of determinants, the only differences appeared were those that irrigated land becomes important, and minority ethnicity stops playing a role. As for the welfare effects, we find that the exporters preserve positive advantage in agricultural income, at the level comparable with the estimates in the full sub-sample (Table 2.7). The other three welfare indicators also demonstrate largely similar results with the outcomes in the main specification given we conduct this comparison on the estimates based on entropy balancing.

Table 2.7: Welfare Effects with Exportable Products Excluded

Increase in welfare if a HH participates in export	Mean difference	Regression on covariates	PS matching	Entropy balancing
AG income, *Soms/month*	3,184.46***	2,717.43**	2,692.76**	1,935.09**
Income, *Soms/month*	1,792.6	963.9	1,040.8	35.6
Consumption, *Soms/month*	-559.2	-238.3	-246.6	-749.9
Asset index, *mean=100*	-14.8	-9.10	-7.31	-2.25
N	*578*	*574*	*565*	*574*

Source: Own estimations based on LiK 2010 and 2011.

2.6. Discussion and Conclusion

In our empirical analysis of export participation of smallholders in Kyrgyzstan, we find that export participation has a marginal positive effect to agricultural income, but no statistically significant effect on other welfare measures, such as aggregate income, consumption, or asset holdings. Moreover, we find no consistent role of the quality requirements as the factor that enhance export participation and plays a significant role in households' welfare generation.

Our results imply that, with the exception of the products, there are no large differences in important characteristics between the domestic and export market participants. The asset approach, which postulates that the level of household assets determine the market participation, finds little support in this study. We document that land size, irrigation, and livestock holdings do not necessarily increase the probability of participation in the export markets. Equally, public services, such as roads, and location do not seem to play major role in export participation decisions.

The results also assume that there is not much effect into poverty from export participation in Kyrgyzstan. However, we are not able at this point to conduct a rigorous 'export participation-poverty' analysis, given the preliminary nature of the results. Such an analysis will benefit from using information from the third wave of the LiK survey and, possibly, from combining the data from KIHS.

One possible reason why there is no consistent positive welfare effect from export participation is that the gate prices the exporting farmers face are not higher than those in the domestic markets. As we discuss in the Appendix, the role of intermediaries in agricultural markets, who largely dictate prices in local and regional markets, is overwhelming. One hypothesis of export participation being not beneficial is that the intermediaries - in order to maximize own margins - use their price-setting power to offer prices that are not different from the domestic market prices.

Our results should be considered as indicative and far from complete for a number of reasons, including the measurement issues, definition of the exporting households, and the applied estimation methods. First, as discussed before, the definition of the export household is quite indistinct and we do not know the intensity of export sales. This issue was addressed in the third wave of the LiK survey. Second, income and consumption data are subject to both

under- and over reporting, for the reasons discussed in the earlier sections. The solution would be to use the models that analyze not the levels, but the changes, in the welfare indicators. The third issue is that we compare the agricultural households that produce different products. As the returns from a product to another vary, we are comparing heterogeneous groups of households. Although the methods we apply and the richness of the confounding variables used in the analysis address these issues to a great extent, a focused study that looks at a particular product and a region may provide more superior insights of welfare effects of export participation. One of the instances of such an interesting research could be a case of kidney beans in Talas oblast, which is a recent export product and is being cultivated by an increasing number of households. As involvement of households in kidney beans production was sequential, by using the information when a particular household started growing it, the use of difference-in-difference methods combined with the matching approach to analyze the resulting welfare effects can be one research area worth investigating.

APPENDIX 2.1: Tables

Table 2.8: Agricultural Module from the Life in Kyrgyzstan Survey, 2011

3. AGRICULTURAL MARKETS

H301	Is any person in this household involved in any agricultural activity?	Yes	1
		No **--> go to Module 4**	2
H301a	What is the ID code of this person?	_____ID	
H302	In his/her job in the agricultural sector, is he/she an… *(if he/she has more than 1 job in agriculture, refer to the primary job (where most time spent)*	Employer	1
		Own-account worker	2
		Wage employee **--> go to question H304**	3
		Contributing family worker	4
		Other	5

3.A. TRADE ACTIVITY

H303	What is the size of all owned and rented land that your household has been cultivating and/or using as pasture during the last 12 months?	_____ Hectare	
H304	Does the household member identified above sell any part of the production output?	Yes	1
		No **--> go to Section 3.B**	2
H308	What is the main product sold by this household member (crop/livestock/by-product)? *(report the most important product)*	Cotton	1
		Tobacco	2
		Wheat	3
		Cereal grains (except wheat)	4
		Potatoes	5
		Fruits	6
		Vegetables	7
		Livestock	8
		Meat products	9
		Raw milk, dairy products	10
		Other	11
H308a	Which portion of total land this most important product occupies?	_____ %	
		Don't know	99
H309	Where / to whom does this household member sell this product? *(report each market share in percentages)*	___% Local market (i.e. within rayon)	1
		___% Regional market (i.e. outside of rayon)	2
		___% Supermarket **--> go to Section 3.B**	3
		___% Exporter or other intermediary exporting it **--> go to 3.B**	4
		___% Processor	5
		___% Other	6
H310	Even if this product is not directly sold to an exporter, does part of it end up outside of Kyrgyzstan at a later stage, i.e. when it is processed, for example?	Yes	1
		No	2
		Don't know	99

3.B. QUALITY REQUIREMENTS

H314	Does this household member or his/her employer fulfil any quality requirements (such as fertilizer/pesticide use, storage, transport, harvesting, hygiene or animal welfare requirements)?	Yes	1
		No **-> go to Module 4**	2
		Don't know **-> go to Module 4**	99
H315	Who informs this household member or his/her employer about or demands the quality requirements?	Main buyer	1
		Cooperative	2
		Government and/or local administration	3
		Other	4
H316	What type of quality aspects does this household member or his/her employer (have to) fulfil? *(multiple answers allowed)*	Fertilizer (type, usage, frequency, bans, …)	1
		Pesticides and other chemicals (type, usage, frequency, bans, …)	2
		Input requirements (certain types of seeds, …)	3
		Storage requirements	4
		Transport requirements	5
		Harvesting requirements (method, time, …)	6
		Hygiene requirements	7
		Equipment requirements	8
		Animal welfare requirements	9
		Other	10

Table 2.9: Overview of the Conditioning Variables

Variable	Definition	2011	2010
HH head characteristics			
Age	Age of household head in years	√	
Female	1=household head is female, 0=male	√	
Kyrgyz	1=household head is Kyrgyz, 0=otherwise	√	
Uzbek	1=household head is Uzbek, 0=otherwise	√	
Other ethnicity	1=household head is non-Kyrgyz and non-Uzbek, 0=otherwise	√	
Migrated within country	1=household head ever moved within country, 0=otherwise	√	
Risk attitude	Self-assessed risk-taking attitude in a scale from 1 to 10	√	
Household demographics			
Household size	Number of members listed by a household; external migrants and students are excluded	√	
Schooling of adults	Average years of reported schooling of adults	√	
Workers in agriculture	Number of adults employed in agriculture	√	√
Workers in other sectors	Number of adults employed in services	√	√
Migrants abroad	Number of adults in labor migration	√	
Household assets			
Operational AG land	Size of owned and rented land used for agriculture, in ha	√	√
Irrigated land	Share of irrigated land in total owned land	√	√
Cars	Number of cars/vans a household owns	√	√
Livestock	Livestock units in sheep equivalent; 1 cow = 5 sheep	√	√
Products			
Cotton and tobacco	1=household cultivates cotton or tobacco as its main product, 0=otherwise	√	
Grains	1=household cultivates wheat or other grain as a main product, 0=otherwise	√	
Potato	1=household cultivates potato as a main product, 0=otherwise	√	
Fruits and vegetables	1=household cultivates fruits and vegetables as its main product, 0=otherwise	√	
Livestock and other products	1=household produces livestock based products (milk, meat) or cultivates other products as a main product, 0=otherwise	√	
Quality requirements	Number of quality requirements a household fulfilled	√	√
Shocks		√	
Agriculture related shocks	Household faced draught, flood, frost or animal diseases in the last 12 months	√	
Family shocks	Household had cases of death, illness or divorce of its members in the last 12 months	√	
Location			
South oblast	1=if Batken, Jalalabat, or Osh oblasts, 0=Chui, Issyk-Kul, Naryn or Talas oblasts	√	
Major road	Distance to a major road, in km	√	
Next market	Distance to next market, in km	√	
Population	Population in the community, in thousands	√	
Next country border	Distance to a closest country border, in km	√	
Altitude	Altitude, in km above sea level	√	

Sources: LiK 2010 and 2011

Table 2.10: Comparison of Income and Consumption from Two Data Sources, 2011

in Soms per month, unless otherwise stated

	Rural		North oblasts		South oblasts	
	KIHS	LiK	KIHS	LiK	KIHS	LiK
Total income	10,480	15,468	9,240	13,336	11,491	17,157
Per capita income	2,932	3,537	2,969	3,275	2,902	3,746
Total consumption	10,219	9,703	9,783	10,510	10,573	9,063
Per capita consumption	2,753	2,193	2,955	2,559	2,588	1,903
Food consumption	6,766	5,541	6,631	5,859	6,876	5,289
Per capita food consumption	1,815	1,251	1,992	1,426	1,672	1,112
Household size	4.2	5.1	3.8	4.7	4.5	5.4
Land holdings, ha	0.9	1.0	1.2	1.5	0.7	0.6
No. of households	1,941	1,685	1,194	745	747	940

Sources: LiK 2011, KIHS 2011

KIHS data are weighted. Use of durables and food eaten out are not included in the KIHS based consumption data.

Table 2.11: Summary of the Lagged Variables, 2010 and 2011

	Year	Total	Domestic	Export	*Difference*
Members working in agriculture	2011	1.72	1.59	1.97	*0.37****
	2010	1.28	1.09	1.66	*0.58****
Members working in non-farm sectors	2011	0.50	0.55	0.41	*-0.14***
	2010	0.48	0.52	0.39	*-0.13***
Operational AG land, ha	2011	1.48	1.55	1.34	*-0.21***
	2010	1.76	1.94	1.40	*-0.54*
Irrigated land, share	2011	0.89	0.86	0.96	*0.10****
	2010	0.88	0.83	0.97	*0.14****
Number of cars owned	2011	0.41	0.43	0.36	*-0.06*
	2010	0.34	0.35	0.33	*-0.02*
Livestock, sheep equivalent unit	2011	25.0	25.0	25.1	*0.1*
	2010	21.9	22.6	20.6	*-2.0*
No. of quality requirements fulfilled	2011	1.59	1.37	2.03	*0.65****
	2010	0.77	0.62	1.07	*0.45****

Sources: LiK 2010 and 2011

The means for domestic market participants (*domestic*) are compared to export participants (*export*) using t-tests.
Significant differences are indicated by * p<0.1, ** p<0.05, *** p<0.01.

Table 2.12: Statistics for Conditioning Variables Before and After Matching and Balancing

	Export	Domestic				Standardized Bias (%)			
		Raw	SNN	Kernel	EB	Raw	SNN	Kernel	EB
HH head characteristics									
Age	51.6	52.8	52.3	53.7	51.6	-9.5	-7.2	-17.7	0.0
Female	0.10	0.14	0.16	0.16	0.10	-12.2	-15.6	-17.0	0.0
Uzbek	0.19	0.08	0.11	0.13	0.19	31.8	8.4	2.9	0.0
Other ethnicity	0.06	0.13	0.07	0.07	0.06	-21.7	1.6	1.3	0.0
Household demographics									
Household size	5.3	5.6	5.2	5.2	5.3	-16.6	3.5	1.5	0.0
Years of schooling of adults	10.8	10.8	10.7	10.6	10.8	-1.7	5.2	10.9	0.0
Members in agriculture, 2010	1.66	1.59	1.49	1.52	1.66	51.7	7.5	4.4	0.0
Members in non-farm, 2010	0.39	0.55	0.41	0.40	0.39	-17.3	0.0	2.5	0.0
Number of migrants abroad	0.34	0.20	0.24	0.23	0.34	19.9	0.7	2.2	0.0
Household assets									
Operational AG land, 2010	1.40	1.55	1.39	1.70	1.40	-10.3	0.6	-5.4	0.0
Irrigated land	0.96	0.86	0.96	0.97	0.96	39.7	0.6	-3.8	0.3
Number of cars owned, 2010	0.33	0.43	0.34	0.36	0.33	-4.8	-5.6	-9.8	0.0
Livestock units, 2010	20.6	25.0	18.6	18.2	20.6	-6.1	7.6	8.6	0.0
Products									
Cotton and tobacco	2.00	0.07	1.60	1.23	2.00	37.0	11.3	32.1	0.0
Grains	0.30	0.27	0.26	0.24	0.30	63.9	-3.8	2.6	0.0
Potato	0.19	0.38	0.26	0.23	0.19	-20.6	-12.2	-6.6	0.0
Fruits and vegetables	0.26	0.13	0.20	0.26	0.26	-25.6	17.0	6.2	-0.1
No. of quality requirements	0.20	1.37	0.25	0.23	0.20	18.5	-8.8	-2.3	0.0
Shocks									
Agriculture related shocks	0.81	0.75	0.84	0.84	0.81	13.9	-2.3	-1.3	-0.1
Family shocks	0.06	0.12	0.07	0.09	0.06	-22.1	-3.3	-9.4	0.0
Location									
Distance to a major road	1.8	1.0	1.6	1.7	1.8	33.3	11.5	8.2	0.0
Distance to next market	8.9	7.4	9.9	9.8	8.9	16.2	-7.1	-6.4	0.0
Altitude	1.2	1.4	1.2	1.1	1.2	-34.7	6.7	15.9	0.0
South oblast	0.53	0.60	0.47	0.48	0.53	-14.1	4.7	2.0	0.0
Mean standardized bias, %						22.6	6.4	7.5	0.0

Sources: LiK 2010 and 2011

SNN means single nearest neighbor matching method; EB – for entropy balancing method. The standardized bias measures the difference in means between the two groups (scaled by the standard deviation). Zero bias indicates identical means and the best matching quality; the bias higher than five indicates about weak matching quality.

APPENDIX 2.2: Qualitative Field Study

In October 2012, we conducted a field study in Kyrgyzstan in order to obtain in-depth information on smallholders' production, sales activities, and relations with downstream firms. Another objective was to clarify their understanding of agricultural income and quality requirements. For this purpose, we conducted extensive interviews with a selection of the households from the LiK survey sample. We also held discussion with experts in Bishkek from the Agribusiness Competitiveness Center (ABCC), Helvetas, International Labour Organization (ILO), International Trade Centre (ITC), University of Central Asia (UCA), and the World Bank.

In total, we interviewed 15 households from the LiK sample.[31] The household interviews took place in three regions of Kyrgyzstan: Issyk-Kul, Osh and Talas. The regions were chosen for their diversity of agricultural products (fruits and potatoes in Issyk-Kul, cotton and tobacco in Osh, and kidney beans in Talas), ranging from traditional crops to novel export products. In Issyk-Kul and Talas, we choose two villages each, while in Osh we visited one village. The selection of villages was based on the LiK 2010 sample and driven by the presence of at least two different household categories in terms of non-sellers, domestic sellers and exporters. The household categorization in LiK was also the criterion for the selection of the households to be interviewed within these villages. Depending on the number of agriculturally active households, we selected eight to ten households per community. Since the groups were not equally distributed across the villages, households belonging to a group covering only few cases were over-sampled. For groups containing sufficient households, the households to be interviewed were randomly selected. We did not achieve our goal of interviewing all the households from our original list due to time constraints and absence of household members at the time of the visit.[32] This is particularly true for Osh and Talas households. Despite the small number of households in some communities and despite the

[31] Moreover, we interviewed additional two households outside the LiK sample. The one was visited in Kara-Suu village in Osh oblast and the other in Kara-Suu village in Talas rayon in Talas oblast.

[32] In detail, 10 households were interviewed in Issyk-Kul oblast (5 households in the village Shor-Bulak in Ton rayon and another 5 households in the village Tyup in Tyup rayon), two households in Osh oblast (in the village Frunze in Nookat rayon), and three households in Talas oblast (two households in the village Aral and one household in the Kara-Suu village, both in Talas rayon).

non-random selection process, our general impression is that the interviewed households are representative.

The interviews we conducted were open-ended and semi-structured. Each interview lasted between one and two hours. Whenever possible, we tried to talk with the household head. In his or her absence, we interviewed other adult household members. In many cases, several household members were present and responded together to our questions. In order to introduce us to the households, we were accompanied by the interviewers who usually conduct the interviews for the LiK survey.[33] In all instances, the interviewers added valuable information during the interviews as well as before and after. Each interview was recorded, later transcribed and translated from Kyrgyz into Russian. The households were not paid for their participation in the interviews, but received a small gift at the beginning of the talks.

The questions we covered referred to the following areas: 1) household composition, education and activity of household members; 2) ownership of productive assets such as land and livestock; 3) agricultural activities (crop cultivation, livestock breeding); 4) agricultural practices (technology, quality requirements); 5) participation in domestic and export markets; 6) information sharing; 7) agricultural income concept; and 8) community problems. Based on these questions, the findings from our field study can be summarized as follows.

Ownership of Productive Assets

Initial economic conditions at the entry to the market system in mid-1990s still matter for current household welfare. This is particularly the case for asset holdings. The amount of land distributed to a household depended on the number of household members. The greater the number of household members, the more land the household received. Despite the existence of a land market since the early 2000s, there seems to have been hardly any change in the landholdings. Strikingly, the same seems to hold for livestock holdings. Those families who risked buying an extra number of livestock during privatization – to be paid back after about one year - seem to be better off currently. The families, who refused to get more livestock, in a fear of inability to pay back, are more vulnerable. Livestock in Kyrgyzstan is not just

[33] In Osh, we were additionally accompanied by an Uzbek-Kyrgyz interpreter. Moreover, in Talas, the person who accompanied us was not the interviewer for these villages, but the deputy head of the oblast statistical office in Talas.

important as a source for food, but also as a crucial savings instrument. Households tend to sell livestock when they need cash, be it for buying crop inputs, clothing, or school items.

Agricultural practices

Land size matters for efficiency. A larger land size at the household level is vital for land sustainability as small plots do not allow rotating crops. This seems to be problematic in the South compared to the North. Many farming households are aware of the necessity of crop rotation; they practise it when they possess sufficiently large land to rotate crops periodically.

Innovations can work. For example, the success with the cultivation of kidney beans in Talas oblast shows that such innovations can be replicated. In general, kidney beans production has two advantages compared with traditional crops such as potatoes or wheat. It is less labor-intensive (including recent mechanization) and relatively easy to preserve (can be stored cold weather; and rodents do not eat them). It has also been an easily marketed product, thus allowing households to sell it by portions anytime during a year. Another example is that in Talas oblast the beans-cleaning combines are produced by local technicians by replicating the equipment imported from Turkey.

Knowledge spillovers happen, but may take a while. Farmers seem to be conservative and risk-averse in adopting new cultures, applying new seeds or novel technology in their cultivation practices. They seem to wait while the innovators explore new things first, and if the innovation is successful, they then adopt it quickly. In this respect, the role of the projects financed by the international development institutions seems to be vital as they tend to promote advanced practices, seeds, and assist in product marketing, including export markets.

Quality standards. Regarding livestock, many households referred to the documents that are needed to sell it in a market. Sales of livestock require a statement on origin from the local administration and a sanitary certificate from the veterinary service.

Participation in domestic and export markets.

The households we interviewed seem to have very good knowledge about market prices. Price information seems to be perfect, especially for livestock markets. Villagers know what the price was in the nearest and regional livestock markets from neighbours who traded in

these markets in the previous weekend. Mobile communication is a big factor for immediate information sharing.

Intermediaries play an important role for market participants. Poorer households tend to sell their products to intermediaries, who resell products further to larger markets, locations, and other countries. Better-off households prefer selling products themselves; mainly livestock. Other products, such as fruits and potatoes, are sold mainly to intermediaries. While the role of intermediaries tends to be valued by most interviewees negatively, as of people "who gain profit by reselling", some accept that this role is risky and that intermediaries have the necessary skills and networks to perform well.

Sometimes, households do not know whether they export. Sometimes it is unclear to the households where the product finally ends up, in particular when they sell at regional markets. We noted in the previous sections that part of the export activity is probably declared as being domestic sales activity.

Buyer-oligopsony market structure brings certainty and disciplines households. It is widely documented that contracts between farmers and processing companies do not work (Light, 2007). Both parties tend to break the contract as soon as they can get better price conditions on the market. In the case of tobacco and cotton, however, there are not many buyers and there are no alternative local/regional markets where the goods can be sold. In this way, farmers have no outside option and tend to fulfil the contracts. The buyers provide inputs, i.e. certainty in terms of input and sales. However, only volumes are contracted. Prices become known close to the harvesting period. In the case of cotton, the purchase price is set about 15 percent lower from the world-market spot prices.

Export markets are important for the general welfare of agricultural producers. This statement is true not only for exporters, who presumably face a higher price compared to prices in domestic markets, but also for non-export participants when importers from other countries are present in domestic markets. For instance, livestock markets face higher prices when there are buyers from neighbouring countries.

Agricultural income concept

A very robust finding is that households seem to understand agricultural income (i.e. profits) as revenues. In particular, they do not quantify own consumption and they do not deduct costs.

Community issues

Self-organization seems to work better in small communities. For example, the households in one of the interviewed small villages in Issyk-Kul oblast jointly clean irrigation channels every spring. On the other hand, the villagers of a larger village (the rayon center) fail to agree on maintenance of such joint public goods, and as a result, many households rely on rain for watering their crops. Some reasons named for this coordination failure include 1) lack of good knowledge about each other between owners of land plots, and 2) unequal opportunities to contribute to the community infrastructure maintenance or investments.

Chapter 3:

Post-Socialist Transition and the Intergenerational Transmission of Education

3.1. Introduction

The collapse of economic output in the transition countries of Eastern Europe and the former Soviet Union markedly increased poverty and inequality. With the distribution of incomes strayed far from egalitarian standards of socialist times (Milanovic, 1999; Milanovic and Ersado, 2008; World Bank, 2000b), the equality of opportunities, including education, is of increasing concern (Micklewright, 1999; UNDP, 2011). Because inequality in income and opportunity tends to transfer across generations (Andrews and Leigh, 2009; Blanden, 2013; Ermisch et al., 2012), the association of socio-economic status between generations strengthened in many transition countries.

However, these findings are mainly based on studies of middle-income post-socialist countries in Europe, such as Bulgaria, Poland and the Baltic countries, which recovered relatively quickly from the economic decline and made substantial development progress during the later phases of transition. There is little research on intergenerational mobility in low income transition countries. Because these countries experienced relatively higher rates of poverty in the early transition, intergenerational links could have strengthened more than in the middle-income transition countries.

We aim to address this knowledge gap by investigating the effect of the transition on intergenerational educational mobility in Kyrgyzstan, a low-income country in Central Asia. We pose three questions in the chapter: (1) what is the magnitude of educational intergenerational mobility in Kyrgyzstan; (2) how has the transition affected educational mobility; and, (3) if there is a gender gap in educational mobility? We use three household surveys, collected in Kyrgyzstan in 1993, 1998 and 2011, to approximate for early, mid, and late transition times, respectively. Using the years of schooling of respondents (aged 20-69) and of their parents, we calculate regression and correlation coefficients to infer the dynamics

of educational mobility. For the transition effect, we conduct the same analysis for the individuals aged 25-34. Gender analysis is conducted by investigating intergenerational developments separately for men and women.

We find that Kyrgyzstan has maintained strong educational mobility, comparable to the levels in Soviet times. We argue that the expansion of tertiary educational institutions in the last two decades is a reason for high mobility. However, consistent with similar studies based on countries in Eastern Europe, we find a sharp increase in educational association between parents and children in the 2011 data for the population aged 25-34, the generation whose schooling and employment experience was most affected by the transition. This may indicate that higher parental socio-economic status may play a more prominent role in children's enrolment at the post-secondary education, while children of less educated parents face fewer opportunities. In addition, we find a gender difference in our estimates that tends to vanish over time. We relate this to the maintenance of gender parity in schooling in Kyrgyzstan since the socialist times.

While our study cannot identify causality, we make three contributions. First, we provide evidence on the effect of the whole cycle of transition to intergenerational transmission using the latest data. Second, addressing the research gap, this is the first detailed study to explore intergenerational mobility in a low income transition country. Third, we analyze the gender dimension of this topic.

The next section discusses the developments in intergenerational mobility in post-socialist countries. Section 3.3 argues that Kyrgyzstan benefited greatly from the Soviet educational equality policy and presents the recent expansion of tertiary educational institutions. Section 3.4 presents the data. The methodology part in Section 3.5 is followed by the presentation of the findings. Section 3.7 discusses the implications and the limitations of the findings.

3.2. Intergenerational Mobility Before and During the Transition

Intergenerational mobility studies - which investigate the extent a socioeconomic status of a young generation is associated with parental background – are important from policy perspective. A higher association of achievements between children and parents brings a

discussion whether the policy should to be adjusted to equalize opportunities in a society. In this respect, post-socialist countries represent a fascinating case of societies that achieved a high level of equality, but after the transition to a market system have seen an erosion of this inheritance.

At the onset of transition, the socialist countries were considered relatively egalitarian and mobile societies in international comparison (Atkinson and Micklewright, 1992; Titma and Saar, 1995; Titma et al., 2003). Driven by policies and interventions, equalization in the socialist times covered many areas of life, be it equality in incomes or access to public services, such as healthcare and education (Hanley and McKeever, 1997). Most prominent were efforts to achieve equalization in education, promoted through universal literacy policy and - in the times of mature socialism - by reverse discrimination. These policies and institutional settings weaken a 'parent-child' association in educational attainment and promote educational mobility.

The policy of universal literacy, implemented by providing free, but compulsory, education, markedly increased educational achievements in the Soviet Union. The literacy campaign started in the Soviet Union in the early 1930s (Smith, 1997). Prior to World War II, the Soviet Union provided 7-years of compulsory schooling; by the 1960s 8 years of compulsory schooling was standard. By 1970 around a half of the Soviet Union's population, aged 10 and older, had basic (either complete or incomplete) or higher level of education (Simirenko, 1972). This policy was especially beneficial for Central Asian countries that had low levels of educational achievements before becoming part of the Soviet Union.

The policy of reverse discrimination - promoting children from lower classes into higher education using quotas and other incentives - was another factor that supported equalization of post-secondary schooling attainment (Ganzeboom and Nieuwbeerta, 1999). Although the equalization policy also promoted upward educational mobility in the socialist countries, its effectiveness varied from country to country.

Confirming aims of the socialist system to equalize human capital, one strand of literature finds high educational and social mobility in the socialism period. Titma and Saar (1995) conclude that real equalization of educational opportunities was achieved in the Soviet Union in the last years of its existence, but that regional differences existed in the availability of secondary education schools. Titma et al. (2003) find relatively high occupational

intergenerational mobility in the European part of the Soviet Union in the last years of its existence. They claim that the Soviet society, in its final years, was relatively open with a low level of social reproduction. Verashchagina (2012) reports increased educational mobility in her study of 12 transition economies in former Soviet Union and Eastern European countries. However, intergenerational mobility was somewhat lower for younger age cohorts.

Another strand of literature challenges the equalizing efforts of socialist system by pointing to the important role of parental background. A study of the three Baltic countries by Hazans et al. (2008) finds that parental education is an important factor on the propensity to earn a university degree both in Soviet times and during transition. Concordant with this line of literature, Gerber and Hout (2004) look at the occupational mobility in Russia before and after the Soviet era. They argue that the occupational positions did indeed depend on class origins, even in the Soviet times, and that the political and economic transition intensified the 'child-parent' association.

With the transition, most empirical literature tends to find a decline in intergenerational mobility. This decline seems to be affected by both economic and structural changes. The early transition processes, such as deterioration in income, increase in economic inequality, and decline in public expenditures were claimed to be harmful for educational mobility. However, the role of structural reforms that encourage more schooling - such as liberalization and expansion of post-secondary educational institutions and reforming the educational systems to meet the needs of transformed labor markets - covered less in the literature. The paper by Fan et al. (1999) argues that a timely restructuring of educational system in a transition economy – to meet labor market needs - is extremely important in order to preserve the stock of human capital, thus ensuring educational continuity between generations. Spagat (2006) develops this concept further and argues that if enough policy efforts are not made to align the educational system with labor markets, the stock of human capital in transition countries will deteriorate and become more similar what is found in middle-income developing countries. Silova et al. (2007) argues that Central Asian countries have already experienced deterioration in publicly funded educational system, and is becoming less effective and less fair.

The early transition years saw a devastating effect on income in a number of transition countries, resulting in high poverty and inequality (Atkinson and Micklewright, 1992; Brück et al., 2010; Milanovic, 1999). Decline of income might force families, particularly the poor

households, to reduce investments in education of their children, especially at the tertiary level (World Bank, 2000a). This assumption is found to be true by Gerber (2000), who documents a growing educational stratification in Russia due to declining enrollment in tertiary education of children with lower parental educational background. Compared to children of more educated parents, a higher share of young people with poorer backgrounds opt to enter the labor market earlier due to the worsening living standards and economic hardship associated with the transition.

As lower level of educational achievement of individuals is usually associated with a higher level of poverty, polarization of incomes in transition countries may lead to a widening educational gap over generations. A multi-country study by Andrews and Leigh (2009) finds a negative link between inequality and intergenerational mobility: individuals in countries with higher levels of income inequality experienced less mobility.

One way to mitigate the economic and social exclusion of poor households is to provide social support. However, during the early transition years public expenditures for social support and public schools declined in most countries. This mostly affected the worse-off households that previously benefited from free schooling. For example, Hertz et al. (2009) document a strong decline in education expenditures in Bulgaria that led to lower enrollment rates for children of less-educated parents.

Liberalization of the educational system in the transition context may drive educational mobility in both directions. Abolishment of the planning nature of the previous system and relaxation of the regulation led to an expansion of tertiary educational institutions. This process is a mechanism that positively affects intergenerational educational mobility as more students can pursue post-secondary studies. However, as new educational institutions are financed mainly by tuition fees, it may reduce opportunities for children from poorer households. This argument, however, does not seem to have played out in practice so far. Tertiary enrollment has grown quite rapidly in the transition countries that have made progress with transitional reforms (World Bank, 2000a).

3.3. Transition and Education in Kyrgyzstan

After the dissolution of the Soviet Union, Kyrgyzstan experienced a dramatic decline in national output and living standards. Despite having recovered economic growth since mid-1990s, the country still remains a low-income economy with a third of the population classified as poor (Table 3.1). Likewise, in the early years of transition the country experienced a sharp - more than double - rise in inequality, associated largely with the early transformational consequences, such as wage arrears and erosion of social safety nets (Mitra and Yemtsov, 2006). Once economic growth resumed, inequality returned to a relatively low level by international standards.

Table 3.1: Kyrgyz Republic: Economic Growth, Inequality and Education
Average per period

	1988-89	1990-94	1995-99	2000-04	2005-09	2010-11
Real GDP per capita, 1989=100	100	80	57	66	78	85
GNI per capita (Atlas method), USD	…	447	360	318	638	860
Income Gini index, %	26.0	53.7	36.0	33.2	37.0	…
Gross secondary school enrollment, %	103.6	97.1	80.0	86.4	86.2	86.1
Gross tertiary school enrollment, %	28.1	24.1	24.9	39.9	45.7	41.3
Public spending on education, % of GDP	…	5.6	4.6	4.2	5.8	5.8

Source: World Development Indicators (2013)

Educational attainment in Kyrgyzstan in the second half of the 20th century progressed considerably thanks to the Soviet Union's universal schooling policy and investments. The literacy rate in Kyrgyzstan increased from 15 percent in 1926 (Lorimer, 1946) to nearly 100 percent by the time of the country's independence in 1991. Education in Soviet times was free at all levels, including higher education (Mertaugh, 2004). Access to higher education, though, was restricted to about one-fifth of secondary school graduates in accordance with the planning nature of the Soviet system (Karklins, 1984).

The structure of the educational system in Kyrgyzstan has largely remained unchanged during the transition. The secondary school system is based on 4-5-2 year scheme. The first, primary level, up to 4th grade, is attended by children aged 7 to 10. The next level, basic education, lasts through grade 9, which is a minimum compulsory school level[34]. After 9th

[34] Compulsory secondary schooling was reduced from 11 to 9 years in 2003 in order to ease pressure on public expenditures. It seems that few opted to discontinue studying after the basic level (illustrated in Table 3.1), driven, probably, by a wider choice of and easier access to tertiary institutions.

grade, students have a choice to continue studying at vocational institutions, or to stay for two more years in secondary school in order to qualify for enrollment in universities[35].

Contrary to experiences of some transition countries, the Kyrgyz government was able to maintain a pre-transition share of public spending on education (World Bank, 2004). This prevented the closure of schools and decline in enrollment; except at the pre-school level (Anderson and Heyneman, 2005; Falkingham, 2005; Mogilevsky, 2011). However, public expenditures on education mainly covered wages of teachers, while other important components of learning, such as textbooks, school infrastructure and teacher training, were underfinanced (Mertaugh, 2004). These factors, along with a shortage of teachers of important subjects, are thought to be main causes of the deterioration in the quality of education[36]. Despite the perceived decline in the quality of education, enrollment rates at the tertiary level have tripled, driven mainly by expanded private universities.

The deregulation of the tertiary education system led to an increased number of private universities, and, correspondingly, students. There were 52 universities in mid-2011; a five-fold increase since Soviet times. As a result, gross enrollments in higher education institutions increased from 10 percent of corresponding age cohort in the beginning of 1990s to approximately 48 percent in mid-2000s (OECD, 2010). This process allowed the child-parent schooling gap in Kyrgyzstan – that was converging in socialist times - to be maintained in transition times. Likewise, the share university educated in adult population increased from 11 percent in 1990 to 16 percent in 2009 (NSC, 2009b) (also see Figure 3.3 in Appendix).

This high university enrollment is driven by aspirations for social status and of greater returns (Roberts et al., 2009). Yet, a university diploma is no guarantee of employment, as there is clearly an excess supply of university graduates in the labor market (DeYoung, 2011) with skills that do not meet the expectations of prospective employers (World Bank, 2012). Given this mismatch, the youth unemployment rate and employment in informal sector are the highest in the labor market compared to older age cohorts (NSC, 2009a; NSC, 2012a).

[35] However, the vocational track allows to enter to universities after completion of vocational study.

[36] For illustration, 15-year-old students from Kyrgyzstan performed worst out of 65 participating countries on the OECD PISA test conducted in 2009 (OECD, 2010).

Examining intergenerational mobility using educational attainments, but not income or other economic status, is justified, at least, for two reasons. First, in the context of a low-income transition economy, the data on earnings and income are not reliable for both children and parents generations. Second, there are no panel data long enough that can measure the socioeconomic status of both children and parents at similar productive ages, thus imposing utilization of recall data. In this respect, educational attainments are more robust measures of socioeconomic status not prone to large measurement and recall errors. At the same time, educational mobility highly correlates with income mobility (Holmlund et al., 2011; Solon, 2004), and the results may be suggestive on developments in economic mobility.

3.4. Data

In this chapter we use information on educational attainment of respondents and of their parents from three household surveys. These surveys, collected in 1993, 1998, and 2011 are well positioned to trace the dynamics of educational mobility during the two decades of Kyrgyzstan's transition. First, the 1993 data is the earliest source that approximately represents the demographic structure and educational attainments achieved in the Soviet times. Second, the 1998 data is important in order to take into account the completion of the early structural reforms and of large internal and external migration of population. For illustration, around 14 percent of 1989 population of Kyrgyzstan out-migrated permanently in the following ten years. It is believed that the ethnic groups that migrated (mainly Russians, Ukrainians, and Germans) had higher educational attainment than Kyrgyz and Uzbeks, the two largest ethnic groups currently (Abazov, 1999a). Finally, the 2011 data is valuable as it includes a young generation that obtained education and joined labor markets during the transition.

The first data source, the 1993 Kyrgyz Multipurpose Poverty Survey (KMPS), is a nationally representative survey designed to measure living standards (NSC, 1993). The sample contains about 2,000 households with 10,000 individuals (Table 3.2). The migration section of the adult questionnaire contains recall information about the level of parental education.

Because we limit our analysis to individuals aged 20-69[37], we exploit 3,987 child-parent observations.

Table 3.2: Summary of Datasets

Dataset	Year	Original sample size		Individual-parent pairs used	of which *(percent of individuals aged 20-69):*		
		No. of households	Members aged 18+		Females	Urban residents	Ethnic Russians
KMPS	1993	1,933	5,018	3,987	52.6	39.4	19.5
KPMS	1998	2,946	8,653	7,345	52.7	40.5	19.4
LiK	2011	2,861	8,151	6,385	52.5	37.0	8.9

Sources: KMPS 1993, KPMS 1998, LiK 2011
Note: 1998 indicators are weighted

The second data source, the 1998 Kyrgyz Poverty Monitoring Survey (KPMS), is a nationally representative household survey with a sample of 3,000 households (NSC, 1998). The family module comprises retrospective questions about parental education and sector of occupation. We examine 7,345 parent-child pair observations. The third data source is the second wave of the panel household survey "Life in Kyrgyzstan", collected in 2011 (Brück et al., 2013). This nationally representative survey collected data from 2,860 households with information about 8,151 adult members. The family module of the survey includes information about parental education and occupation. The available number of respondent-parent observations is 6,385.

Data collection of all three surveys was done in the same period (October-November). We apply sample weights to the 1998 dataset as its sample was not proportional to the population. The three data sources are comparable on gender and locational dimensions, and seem to accurately reflect national level ethnic composition changes.

The analysis is conducted using years of schooling of respondents (children generation) and of their parents. For children we use reported cumulative years of secondary and post-secondary schooling available in the 1998 and 2011 surveys. In the 1993 data, only the

[37] In addition to including mostly working aged population, the choice of this particular age cohort allows us to address measurement errors associated with recall information of old-aged respondents and censored nature of educational information of currently studying respondents at age below 20.

reported years of secondary schooling is available; we transform the reported post-secondary education category to years of schooling based on time needed to complete this schooling (Table 3.8 in Appendix). Except for the parents who resided with their children and thus reported own years of schooling, this counting procedure was also applied to calculate the years of schooling of non-resident parents in all three data sources. This approach potentially leads to some inaccuracies, such as fewer years of schooling for repeaters, dropped students, and holders of more than one post-secondary education. The other issue is different years of schooling associated with presumably the same level of education: from the prospective of the current educational system, some parents may be assigned more years of schooling than they have in fact studied. Nevertheless, the years of schooling of both children and parents seems to fit well across three datasets (if compared using common age cohort of children born in 1942 to 1976, the difference in parental schooling was 0.2-0.6 years between the datasets).

We do not exclude individuals who were studying at the time of the surveys. Instead, we calculate the years of post-secondary schooling by distracting one year from the current grade of an enrolled individual. It is a compromise solution to lessen a measurement bias from the two extremes: 1) dropping the enrolled individuals from the analysis, or 2) including them by counting only the last completed education. In general, the share of enrolled individuals among aged 20-24 was 8, 10 and 22 percent, respectively, in 1993, 1998, and 2011. The share of enrolled among aged 25-34 was less than 2 percent in all three datasets, and nearly zero for the other older age cohorts. In the sensitivity analysis we show the results with the enrolled individuals excluded.

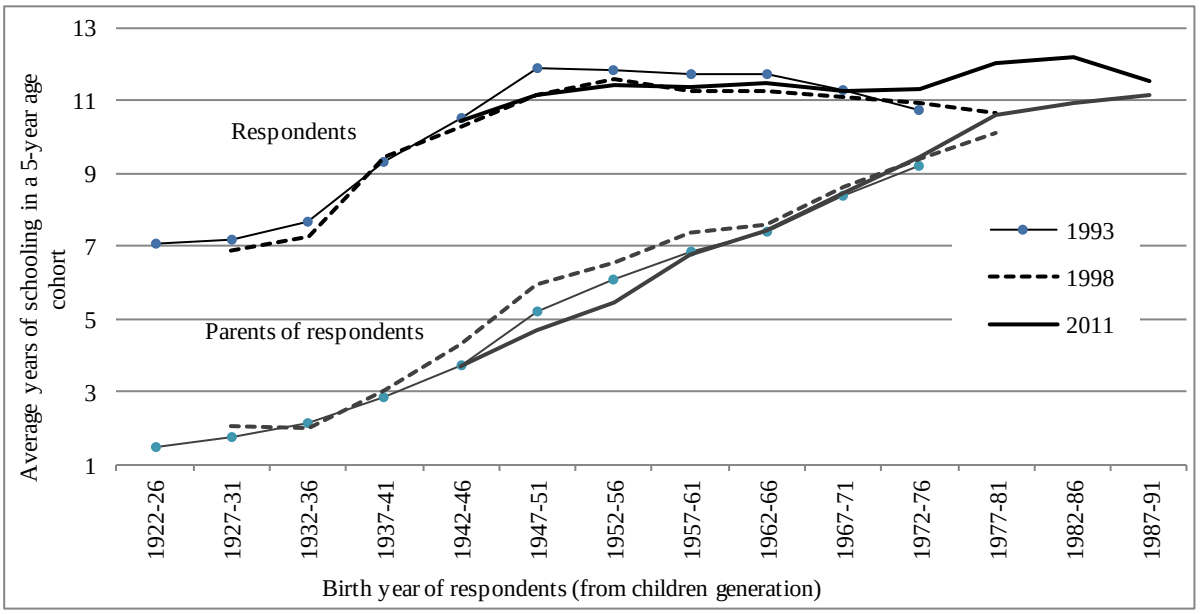
We use average years of schooling of both parents in majority of our analysis. While a "father-son" pair is a yardstick in most intergenerational mobility studies, we follow the approach of a number of papers (Hertz et al., 2007; Verashchagina, 2012) by considering both female and male individuals and compare their years of schooling to the average years of schooling of both parents. If educational information of one of the parents is missing, we assign him/her the educational information of the other parent. This approach is justified given the low share of individuals with partial parental information[38] and a high degree of

[38] In KPMS 1993, 11 percent of cases lacked information on one of the parent's education. In KMPS 1998, and LiK 2011, the number of missing observations for one of the parents' education constituted, respectively, 1.5 and 5.1 percent of the sample used (see also Table 3.7 in Appendix).

educational assortative mating among the parents (correlation in years of schooling of the parents ranges from 0.76 to 0.79 in the three datasets). For a robustness check, we conduct the analysis using only observations where both parents' education is available.

The data demonstrate a remarkable increase in educational attainments in Kyrgyzstan over 70 years. Figure 3.1 - which depicts the average years of schooling of the respondents and of their parents in the three surveys - demonstrates that the schooling of the children increased from seven years to about 12 years. The schooling of parents progressed more rapidly and grew from about two years to 11 years. Accordingly, the educational gap between the children and parents declined from around five years to one year.

Figure 3.1: Years of Schooling of Respondents and of Their Parents



Sources: KMPS 1993, KPMS 1998, LiK 2011
Note: 1998 numbers are weighted.

Table 3.11 in Appendix reiterates an increasing educational attainment in Kyrgyzstan over time and provides some interesting comparisons, such as share of university educated. It also presents the descriptive statistics for the young group of aged 25-34, a group where the share of university educated in 2011 data increased to 27 percent – twice what it was in both the 1993 and 1998 samples. Parental schooling years are on rise in both the total and young samples; the notable feature is reduced variation in parents schooling in 2011 sample, which affects the differences in the indicators of intergenerational transmission.

Comparison of schooling among ethnic groups confirms some common beliefs (Table 3.10). First, the schooling of Russians in both children and parent samples is absolutely higher

compared to other ethnic groups (except for the parental schooling in 1993). Second, despite increased parental schooling, Uzbek children advanced little beyond the parental education, which might be explained by earlier participation in labor markets[39].

3.5. Empirical Approach

In line with the literature, we estimate two basic indicators of correspondence in schooling between parents and children: a regression coefficient by using OLS and a correlation coefficient. Both indicators measure the degree of educational transmission across two generations: the higher the coefficient of the indicators, the lower is the intergenerational mobility.

Our base OLS regression specification is following:

$$S^C = \beta_0 + \beta_1 S^P + \varepsilon \tag{3.1}$$

where S^C is the years of schooling of an individual, S^P is the average years of schooling of both parents; superscripts *C* and *P* stand for children and parents, respectively. The regression coefficient β_1 shows how a one-year increase in the schooling of parents raises the expected schooling of their children. In order to compare the results with the correlation coefficient, we do not control for age of individuals in this specification. The correlation coefficient, ρ, is linked to the regression coefficient in the following way:

$$\rho = (\sigma^P / \sigma^C)\, \beta_1 \tag{3.2}$$

where, σ^P and σ^C are the standard deviations of schooling, respectively, of parents and children. Correlation provides the same interpretation of intergenerational transmission; though it measures an association between a one standard deviation change in parents' education and a one standard deviation change in children's education. Both correlation and regression coefficients will match if the standard deviation of years of schooling in two generations are of comparable magnitude. If the dispersion of parental schooling is larger than of children's, then a correlation coefficient will be greater than a regression coefficient.

[39] For instance, in the LiK 2011 data a share of enrolled Uzbeks in the youngest age cohort (aged 20-24) was 5 percent compared to 28 and 24 percent, respectively, for Kyrgyz and Russians.

In order to measure the effect of transition we compare the correlation and regression coefficients for those aged 25-34 in each sample (referred as 'young group'). This group is chosen because these individuals in the 2011 data made decisions and obtained education after 1991, when the transition started in Kyrgyzstan. Individuals from comparable age cohorts from 1993 and 1998 surveys obtained education mostly before the transition.[40] Approximating these periods for "before and after" transition, we may judge on the existence of a transition effect if there are differences in indicators in 2011 compared with those estimates for the two earlier surveys.

To provide an insight on the dynamics of the educational mobility, the analysis is also conducted using five-year age cohort groups. Thus, for each dataset comprising individuals aged 20-69, we form ten age cohort groups.

Gender effect is identified by measuring the correlation and regression coefficients separately for male and female individuals.[41] If there are significant differences in the estimated correlation or regression coefficients, we conclude that there is a gender effect.

We extend regression analysis by controlling for age, ethnicity and location. These variables, available in all three datasets, allow to control for policy changes (pertaining to age groups), cultural norms and labor market participation practices (in case of ethnicity) and location characteristics (such as school quality and labor market features). Equation (1) extends now to

$$S^C = \beta_0 + \beta_1 S^P + \beta_3 Age^C + \beta_4 Ethnicity^C + \beta_5 Urban^C + \beta_6 Oblast^C + \varepsilon \quad (3)$$

In addition, exploiting 2011 data we add to specification (3.1) information on siblings and extra parental information, namely job position and membership in the Communist party in socialist times. Both variables are served to capture parental income and social status as well as social networks that that may affect educational attainment of children.

[40] This 'young group' from the 2011 sample was at age 5-14 in 1991.

[41] The gender effect regression analysis can be also conducted by using a female dummy and its interaction with other covariates. We prefer a separate group analysis.

3.6. Results

In the following we present the results for total and young samples; then discuss gender differences and dynamics of the mobility using age cohorts. The enrichment of the regression analysis by controlling for additional variables completes this section.

Both indicators of intergenerational educational mobility in Kyrgyzstan demonstrate improvement over time. The first part of Table 3.3 shows that both regression and correlation coefficients, calculated for individuals aged 20-69, dropped considerably: the regression coefficient declined from 0.27 in 1993 to 0.17 in 2011, while correlation coefficient changed from 0.39 to 0.28 over the same period. This level of the regression coefficient as a measure of intergenerational mobility is extremely low by international standards (Hertz et al., 2007) (see also Table 3.6 in Appendix).

Table 3.3: The Relation Between Parents' and Children's Education

	Regression coefficient			Correlation		
	1993	1998	2011	1993	1998	2011
	Total sample of individuals aged 20-69					
Parental years of schooling	0.27***	0.27***	0.17***	0.39	0.40	0.28
Adj.R-squared	*0.15*	*0.16*	*0.08*			
No. of observations	*3,987*	*7,345*	*6,385*			
	Sample of individuals aged 25-34					
Parental years of schooling	0.13***	0.20***	0.50***	0.26	0.36	0.42
Adj.R-squared	*0.06*	*0.13*	*0.18*			
No. of observations	*1,176*	*2,064*	*1,622*			

Sources: KMPS 1993, KPMS 1998, LiK 2011

Note: 1998 results are weighted. The regression specifications do not include any other control variables. Parental education coefficients in the regressions are significant at 1% level (marked ***).

The results for 1998 are not directly comparable with the estimates of Hertz et al. (2007) who use the same data source for Kyrgyzstan. The replication of the results by using the described method of counting the years of schooling and averaging the regression and correlation coefficient for ten cohorts resulted in 0.25 against 0.20, and correlation at 0.31 against 0.28. The possible reasons for differences are sample size and the way the years of schooling are derived.

For individuals aged 25-34 we observe rapidly increased association with education of parents (second part of Table 3.3). Compared with relatively weak intergenerational

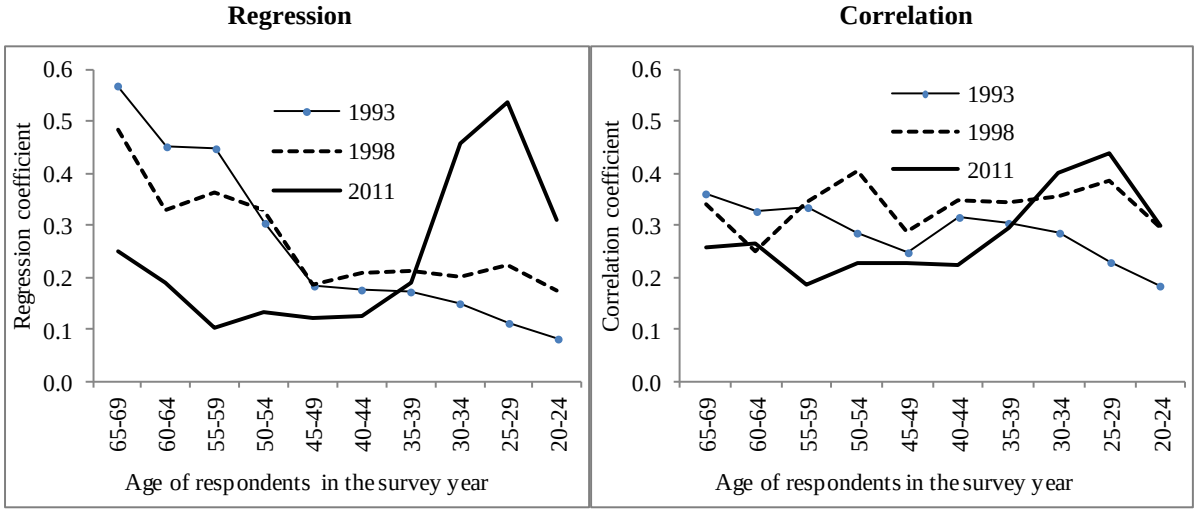
association in 1993 and 1998, the 2011 outcomes imply that this link has strengthened considerably: one extra year of parental education is now associated with 0.5 additional years of schooling for their children. The correlation based comparisons also support this conclusion, though the extent of the rise was relatively moderate. This finding is consistent with the evidence from Bulgaria (Hertz et al., 2009), where the association in schooling of young population with parental schooling increased rapidly.

The increased association of child-parent association is even more pronounced, when we conduct the analysis using educational categories. To do so, we regrouped educational categories from the three datasets into five categories: primary and below, basic, secondary, post-secondary professional, and university. We regress years of schooling of children to highest educational category of one of the parents; we also calculate Spearman rank correlation using educational categories for both children and parents. The regression analysis results, presented in Table 3.12 in Appendix, demonstrate an increasing association of post-secondary and university education of children and parents. For example, having a university educated parent in 1993 was associated with additional 1.1 years of schooling of children in the young group; this quantity has increased to 2.8 years in 2011. Likewise, Spearman rank correlation results are consistent with the inference of increasing role of parental education for younger age cohorts.

We conduct a number of robustness checks using alternative groupings. For this purpose, we (1) enlarge the young group to aged 20-34, instead of aged 25-34; (2) consider aged 35-44 to approximate for the youngest pre-transition age group; (3) exclude the individuals enrolled in post-secondary studies; and (4) exclude the individuals who reported education of only one of either parents (Table 3.14 in Appendix). First, inclusion of individuals aged 20-24 in the young group levels down both regression and correlation coefficients due to higher share of the enrolled individuals. However, the magnitude of increase in intergenerational association between 1993 and 2011 for this group was much higher compared to aged 25-34. Second, the analysis of aged 35-44 does not reveal any increase in intergenerational link in education: regression coefficient was relatively flat and low, while correlation was in downward track. Third, exclusion of the enrolled individuals does not alter or marginally raises both regression and correlation coefficients. Finally, the results using only full parental information reveal nearly no difference with the base model outcomes.

To examine the dynamics of educational mobility, we calculate the regression and correlation coefficients individually for ten 5-year age cohorts. Figure 3.2 plots separately the regression and correlation coefficients for each age cohort; each of three lines represents the results for one of three datasets. As shown, the regression results for 1993 and 1998 are relatively consistent with each other implying gradual decline in intergenerational association in education from older to younger cohorts. In contrast, the dynamics of the regression coefficient based on 2011 data was 'U'-shaped and relatively low for the oldest seven cohorts; then it increased sharply for the youngest three age cohorts. The dynamics of the correlation coefficient, from the other angle, was consistent with this trajectory when the 2011 data used, though the scale of change was less volatile. It is necessary to note that both indicators in the youngest cohort show a decline that is explained by a high share of individuals who are still enrolled and, thus, may have lower - than parents – education at the time of the surveys.

Figure 3.2: Regression Coefficients and Correlations of Schooling Across Age Cohorts



Sources: KMPS 1993, KPMS 1998, LiK 2011
Note: 1998 estimations are weighted. The correlation and regression coefficients are derived for each of the ten cohort group. The age of respondents calculated as of the year of the surveys.

The gender related results for the total sample (in Table 3.4) indicate that females (from the children generation) are less mobile than males. The difference is statistically and economically significant in the regression results for all three years. This gender gap also holds when correlation coefficients are considered. However, when we analyze gender based mobility in the young group, we do not find large differences in the 1993 or 2011 based on either regression or correlation estimations; only in 1998 data is there a significant difference.

Elimination of the gender imbalance has to do with more schooling among women than men, starting with the 1950s generation. In addition, the results of 2011 data suggest that both young females and males - exposed to transition transformation - experienced an increase in intergenerational association in education.

One dimension of gender based analysis is to separately examine a role of maternal or paternal education in relation to the schooling of sons and daughters. Table 3.13 shows regression and correlation coefficients for education of sons and daughters versus schooling of fathers and mothers. This disaggregation does not reveal any differences in intergenerational association of education: schooling of both fathers and mothers - analyzed individually - seem to have similar effects on education of children.

Table 3.4: Educational Mobility by Gender

	Regression coefficient			Correlation		
	1993	1998	2011	1993	1998	2011
Sample of aged 20-69						
Male	0.21	0.20	0.13	0.33	0.33	0.22
Female	0.32 ++	0.33 ++	0.21 ++	0.44	0.47	0.33
Sample of aged 25-34						
Male	0.13	0.17	0.49	0.26	0.32	0.43
Female	0.13	0.23 ++	0.50	0.25	0.41	0.41

Sources: KMPS 1993, KPMS 1998, LiK 2011

Note: 1998 results are weighted. The dependent variable is years of schooling of individuals. The right-hand side variable of interest is parental years of schooling; no other control variables are included. The regression coefficients are significant at 1% level in all years and groups. Statistically different estimates between male and female at 5% confidence level are marked "++".

We extend the regression analysis above by adding a number of confounding factors that affect schooling of individuals in the children sample. These are age, residency location, and ethnicity. This information is available in all three datasets. Adding age dummies allows for age specific effects - such as changes in compulsory years of schooling – that affected education of individuals beyond parental control to be accounted for. Inclusion of residency information controls for the fact that more educated individuals are likely to live in urban and more populous areas. Ethnicity of individuals seems to play a role in educational attainments, as it was evident from differences in schooling among three major ethnic groups in Kyrgyzstan (see Table 3.10 in Appendix).

The second expanded specification, though limited to 2011 data, includes sibling information and parental characteristics such as white collar job positions (high-job position) and

membership in the Communist party during socialist times. A larger number of siblings may be associated with lower probability of obtaining post-secondary education if there were credit constraints for parents. A high occupational position of parents incorporates job positions, such as managers and white collar workers. These parental job positions are not strongly linked to higher educational attainment, as our data suggest. A membership of any parent in the Communist party during socialist times indicates not only a relatively higher public decision making position, but also a relatively superior public and economic position after the transition. Membership in communist party was necessary to gain high administrative and managerial positions; after the transition most of these people remained active in politics and extended their power in business (Mikhalev and Heinrich, 1999). As such, parental communist background could be a strong predictor of a better off social or economic position of individuals in current times, including education[42].

First, we comment on the specification that controls for age, location and ethnicity. Confirming our expectations, the regression coefficient is considerably lower for total sample in 1993 and 1998, but not in 2011 (Table 3.5). This inference also takes place for the young group, but the magnitude of decline is relatively moderate. In terms of dynamics of the intergenerational mobility, our results seem to conform to above evidence that Kyrgyzstan, in general, maintains high educational mobility, but that the schooling of younger population seems to correlate much more with parental background.

In respect to location, city residents have in average more schooling that rural residents; however, this effect is not significant in 1998 data. Individuals living in capital city Bishkek have 0.5- 1.4 more years of schooling compared to population in Chui oblast. Among regions, the residents of South oblasts seem to have less schooling in 1993 and 1998 datasets; however, this difference is opposite in 2011 data, especially in the young group.

Ethnicity seems to play a prominent role in educational attainments in Kyrgyzstan. Whilst lower educational level among Uzbeks has been a broadly known fact, the fact that Russians have, on average, slightly less schooling than Kyrgyz - though significant only for young group in 1993 and 1998 - is somewhat surprising.

[42] In LiK 2011 data about three percent of individuals reported to have a parent who was a Communist party member in the socialist times.

Table 3.5: Regression Estimates Including Covariates

	Total sample, aged 20-69				*Young sample, aged 25-34*			
Variable / Year	1993	1998	a) 2011	b) 2011	1993	1998	a) 2011	b) 2011
Parental years of schooling	0.14***	0.17***	0.15***	0.13***	0.10***	0.17***	0.41***	0.37***
Urban	0.69***	0.04	0.46***	0.37**	0.58***	0.07	0.35*	0.26
Bishkek	0.48**	1.18***	1.01***	1.04***	0.65***	1.18***	1.27***	1.36***
South	-0.11	-0.62***	0.00	0.04	-0.13	-0.16*	0.29***	0.38***
North, excl. Chui	0.28**	-0.12	-0.10	-0.09	0.09	0.09	0.06	0.10
Russian	-0.04	-0.22	-0.05	-0.11	-0.57***	-0.48***	-0.01	-0.17
Uzbek	-0.56**	-0.49***	-0.84***	-0.84***	-0.52**	-0.46*	-1.24***	-1.23***
Other ethnic group	-0.36**	-0.61***	-0.76***	-0.74***	-0.23	-0.33**	-1.07***	-1.04***
Siblings				-0.01				-0.04*
Parental high-job position				0.42***				0.33**
Parental membership in Communist party				0.80***				1.21***
Constant	9.2***	9.0***	9.1***	9.17***	10.6***	9.7***	7.2***	7.5***
Adj.R-squared	0.33	0.30	0.18	0.19	0.11	0.19	0.25	0.25
No. of observations	3,987	7,345	6,385	6,363	1,176	2,064	1,622	1,617

Sources: KMPS 1993, KPMS 1998, LiK 2011

Note: 1998 results are weighted. The dependent variable is the years of schooling of individuals. Kyrgyz and Chui oblast are the reference groups, for ethnicity and regions, respectively. Additionally, all regressions include age dummies. The regression coefficients are significant at 1% level when marked '***'; at 5% level when marked '**'; and at 10% level when marked '*'. Standard errors are clustered at strata level.

Interesting insights emerge when we control for siblings and parental high job positions and Communist party membership. There is a strong association of parental job position and Communist party membership for educational attainment of their children (column "(b) 2011" in Table 3.5). These two parental characteristics in both total and young sample are more important to the educational attainment of children than parental education. For instance, parental Communist party membership is associated with an additional 0.8 years of children's schooling in total sample, but even more in the young sample. Number of siblings seems to play some negative role for educational attainment for children in the young age group, although the effect is only marginally significant.

3.7. Discussion and Conclusion

This chapter contributes to the research on intergenerational mobility in transition and low income countries by considering the case of Kyrgyzstan. We find that the population aged 20-69 in 2011 maintained high educational mobility over the twenty years of transition. For a low-income country that experienced a sharp decline in living standards and rise in income inequality, this outcome is surprising. This contrasting result can be associated, among other factors, to an expanding number of higher education institutions, which allowed a greater share of secondary school graduates to pursue university education.

We conclude that the dynamics of intergenerational transmission of education in Kyrgyzstan is similar to other post-socialist countries; however, the degree of intergenerational mobility is particularly high compared to both transition and low income countries (Table 3.6). In light of these findings, what may be the drivers of high educational mobility in Kyrgyzstan? Partly, the answer lies in the relatively scattered distribution of educational attainments. Kyrgyzstan shares with the low-income economies the characteristics of its older population having an extremely low level of schooling. In the study by Hertz et al (2007), parental schooling in the two oldest age cohorts in Kyrgyzstan is 1.5 years[43], a number that is far below the average of 6.3 years across all transition countries covered (see Table 3.6). However, the educational attainment of the youngest parents and the youngest children practically converged to the levels of Eastern European countries. As illustrated in Figure 3.1, after 2000 Kyrgyzstan reached a point when both parents and children had equally advanced educational attainment. Thus, this evidence led us to conclude that Kyrgyzstan, and broadly Central Asian countries, are unusual in terms of intergenerational mobility.

The gender analysis reveals that females tend to experience lower intergenerational mobility than males in Kyrgyzstan. However, this gender difference in educational transmission is mainly driven by older-aged individuals as this disparity does not exist in younger cohorts. As in many post-socialist countries, this finding points out to improved gender parity in educational attainment in Kyrgyzstan.

[43] In our study, years of parental schooling of the oldest age cohort (in children group) were respectively 1.6, 1.7 and 3.7 years in 1993, 1998, and 2011 surveys.

High intergenerational educational mobility in Kyrgyzstan is inherently linked to the legacy of Soviet educational investments and equalization policies. However, with the transition we observe an increase in intergenerational transmission of education for young population as our 2011 estimates for the individuals aged 25-34 indicate. While this age group experienced expansion of higher education system, the results are suggestive about growing role of parental background, including education and social status.

Does this finding imply that role of parental background will increase in the future? The literature suggests three drivers of change in intergenerational mobility: the equalizing nature of public expenditure on education, development in economic inequality, and returns to education (Blanden, 2013; Verashchagina, 2012).

Two equalizing mechanisms - compulsory schooling and public expenditures - facilitate relative equality in access to basic and secondary education in Kyrgyzstan. However, as previous studies document, a growing number of students were not completing secondary schooling (Anderson and Heyneman, 2005; Micklewright, 1999). The differences in opportunities became more evident at the post-secondary level, where equalizing institutions of the socialist system were no longer in place and the sector is dominated by private institutions. At the same time, increased enrollment in universities is indeed surprising, given rising costs for education and skills mismatch to the needs of labor markets, unless returns to education are sufficiently high. Returns to university education in Kyrgyzstan were, in fact, relatively high in mid-1990s. In particular, Anderson and Heyneman (2005) document that college educated individuals in Kyrgyzstan would expect to earn 17-21 percent higher wages compared to individuals with only basic or lower education. However, given an increased number of university educated individuals in the 2000s, it is relevant to determine whether the wage gap has been maintained; we hypothesize that this return may have been driven down by the increased supply of labor.

As modeled (Solon, 2004) and documented in a number of studies (Andrews and Leigh, 2009; Blanden, 2013), intergenerational mobility is negatively correlated with inequality. As demonstrated in Table 3.1, income inequality in Kyrgyzstan was very high in the early 1990s, but then returned to a moderate level. In this respect, we are not yet able to say much how the income inequality and intergenerational mobility are linked in Kyrgyzstan.

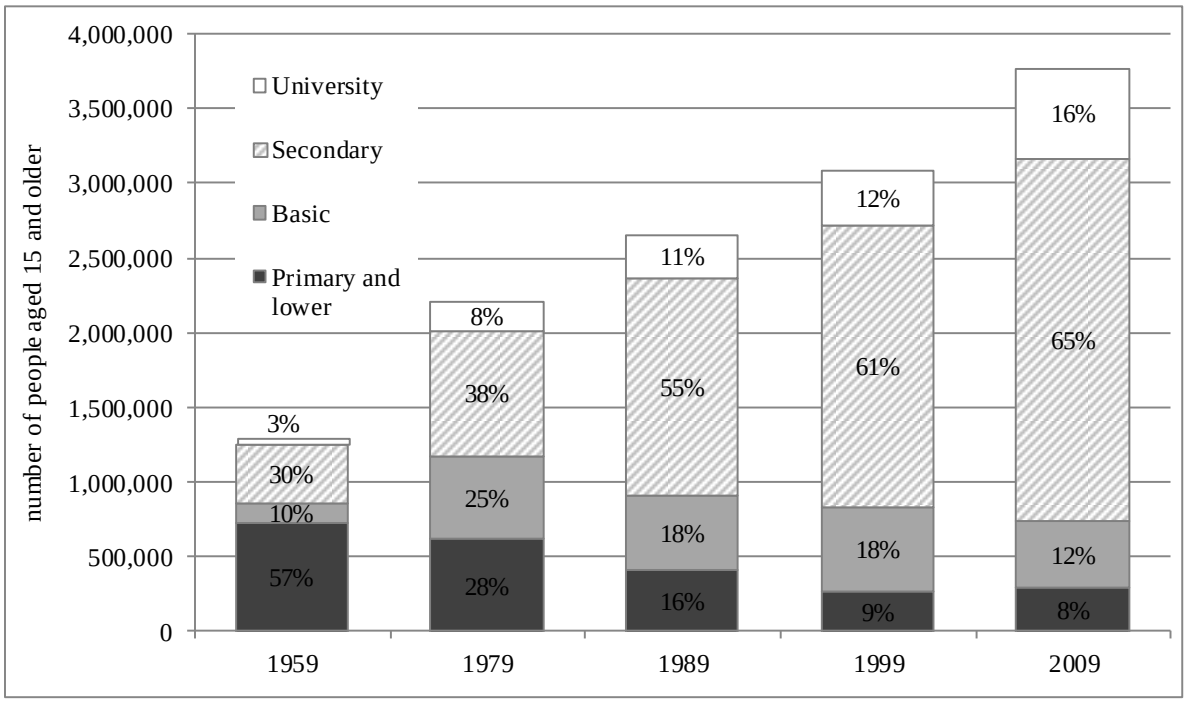
The changing pattern of educational attainments across regions in Kyrgyzstan mirrors migration developments to a great extent. Both external and internal migration seem changing the educational landscape in the country. As discussed before, de-integration of the Soviet Union led to the permanent, disproportionate, migration of better educated people (Abazov, 1999a); but the recent permanent and temporary migration also involve a sizable share of skilled population. On the other hand, a rural-urban migration, intensified in the last decade and driven by economic factors, also involves more educated individuals while less educated individuals remain in villages. This internal migration pattern, if continued, may be another factor that will adversely affect intergenerational educational mobility.

We note that young population of non-Kyrgyz ethnic groups seem to lag behind in schooling compared to the Kyrgyz, and it would potentially indicate about existence of some forms of discrimination in segments of labor market where tertiary education is demanded.

Finally, the increasing ratio of people with university education may have a political implication, as it was case in some Arab Spring countries. As more university graduates participate in the labor market either as unemployed, or employed in low-qualification jobs, dissatisfaction with economic and labor market policies may transform governments due to mass demonstration and upraise of youth. In Kyrgyzstan, which experienced change in its political regime in 2005 and 2010, the educated labor force does not yet seem to be the main factor in the political disruptions, but it may become so in the future.

APPENDIX 3.1: Figures and Tables

Figure 3.3: Educational Attainment of Population Aged 15+



Source: National Statistics Committee, Population Census data from the respective years

Note: Shares of educational categories sum up to 100 percent.

Table 3.6: Countries Ranked by Average Parent-child Correlation in Education

individuals aged 20-69

Country	Rank out of 42 countries	Correlation	Regression coefficient	Average years of education				Survey year
				Parents		Children		
				Cohort 1|2	Cohort 10	Cohort 1|2	Cohort 10	
Low-income countries								
Bangladesh	28	0.38	0.58	0.8	2.9	2.1	5.9	1996
Nepal	33	0.35	0.94	0.1	1.4	0.7	5.5	2003
Ethiopia	42	0.10	0.75	0.0	0.3	0.1	3.1	1994
Lower middle income countries								
Indonesia	8	0.55	0.78	0.8	5.1	2.6	9.1	2000
Vietnam	20	0.40	0.58	0.9	5.4	3.5	7.3	1998
Ghana	25	0.39	0.71	0.6	4.8	2.5	8.1	1998
Transition countries								
Slovenia	10	0.52	0.54	6.8	10.4	8.9	12.5	1998
Hungary	12	0.49	0.61	6.7	11.4	9.6	12.0	1998
Estonia	23	0.40	0.54	6.2	10.9	11.4	13.0	2004
Ukraine	26	0.39	0.37	5.6	12.0	10.4	12.9	2004
Poland	31	0.43	0.48	5.5	9.6	8.6	11.9	1994
Czech Rep.	34	0.37	0.44	9.3	12.0	11.8	12.4	1998
Kyrgyzstan	40	0.28	0.20	1.5	10.0	6.6	10.6	1998

Source: Adapted from Hertz et al. (2007)

Table 3.7: Sample Formation

	KMPS 1993	KPMS 1998	LiK 2011	Treatment
Total sample of individuals aged 18+	5,018	8,653	8,151	
Younger than 20 or older than 69	*610*	*1,150*	*1,021*	*Dropped*
Sub-sample of individuals aged 20-69	4,408	7,503	7,130	
No education information	*8*	*74*	*37*	*Dropped*
Individuals aged 20-69 with education information	4,400	7,429	7,093	
No information on the education of either parent	*413*	*84*	*708*	*Dropped*
Final sample used in the analysis	3,987	7,345	6,385	
Education information for one parent is missing	*451*	*111*	*324*	*Assigned the other parent education*

Sources: KMPS 1993, KPMS 1998, LiK 2011

Table 3.8: Calculation of the Years of Schooling

1993[1]		1998[1]		2011[1]	
Educational categories	Years of schooling	Educational categories	Years of schooling	Educational categories	Years of schooling
Years of secondary school completed	(A) Reported years [0-11]	None	0	Illiterate	0
Vocational courses, e.g. courses for tractor drivers, drivers, typists, accountants	(A)+1	1-8th class	Reported years [1-8]	Primary	3
Vocational-technical school, not granting secondary diploma	(A)+2	Incomplete secondary	9	Basic	8
Vocational-technical school with secondary education, technical school	(A)+3	Complete secondary	10	Secondary general	10
Technikum, medical, music school, school of education	(A)+3	Professional-technical school	11	Primary technical	11
Institute, university, academy	(A)+5	Technikum	13	Secondary technical	13
Graduate school, residency	(A)+8	Higher educational diploma	15	University (bachelor, diploma, master)	15
		Candidate or doctor of science	18	Candidate or doctor of science	18
		Other	4		

Sources: KMPS 1993, KPMS 1998, LiK 2011

1/ Reported years of both secondary and post-secondary education are used in the analysis. The presented scale is mostly applied to calculate parental years of schooling.

Table 3.9: Sample Size by Five-year Age Cohorts

		KPMS 1993		KPMS 1998		LiK 2011	
	Age range	Birth years	Sample size	Birth years	Sample size	Birth years	Sample size
Total	20-69	1924-1973	3,987	1929-1978	7,345	1942-1991	6,385
Cohort 1	65-69	1924-1928	188	1929-1933	385	1942-1946	128
Cohort 2	60-64	1929-1933	233	1934-1938	406	1947-1951	331
Cohort 3	55-59	1934-1938	234	1939-1943	350	1952-1956	514
Cohort 4	50-54	1939-1943	232	1944-1948	367	1957-1961	684
Cohort 5	45-49	1944-1948	247	1949-1953	649	1962-1966	685
Cohort 6	40-44	1949-1953	380	1954-1958	769	1967-1971	668
Cohort 7	35-39	1954-1958	539	1959-1963	1,023	1972-1976	654
Cohort 8	30-34	1959-1963	582	1964-1968	990	1977-1981	711
Cohort 9	25-29	1964-1968	594	1969-1973	1,076	1982-1986	911
Cohort 10	20-24	1969-1973	758	1974-1978	1,331	1987-1991	1,099

Sources: KMPS 1993, KPMS 1998, LiK 2011

Table 3.10: Schooling by Ethnic Groups

	Year of schooling			Years of schooling of parents		
Ethnic group	1993	1998	2011	1993	1998	2011
Sample of aged 20-69						
Kyrgyz	11.0	10.8	11.7	6.5	7.3	8.9
Uzbek	10.3	9.7	10.7	5.2	5.8	8.2
Russian	10.9	11.2	12.4	6.3	7.9	9.5
Others	10.3	10.1	10.9	4.9	6.2	8.0
Sub-sample of aged 25-34						
Kyrgyz	11.8	11.2	12.4	7.6	8.6	10.8
Uzbek	11.1	10.3	11.0	5.7	6.6	10.5
Russian	11.9	11.5	13.4	9.1	10.5	12.0
Others	11.6	10.9	10.8	5.9	7.6	9.9

Sources: KMPS 1993, KPMS 1998, LiK 2011

Note: calculations for 1998 are weighted

Table 3.11: Years of Schooling Based on Three Data Sources

	1993		1998		2011	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
			Total sample, ages 20-69			
Individual's years of schooling	10.8	*3.0*	10.7	*2.9*	11.6	*2.4*
Parental years of schooling	6.1	*4.3*	7.1	*4.3*	8.8	*3.9*
University educated, share	0.14		0.13		0.18	
Age of individuals	37.9		38.1		39.1	
Female, share	0.53		0.53		0.52	
Shares by ethnic groups						
Kyrgyz	0.52		0.59		0.67	
Russians	0.19		0.19		0.09	
Uzbeks	0.15		0.12		0.13	
Other groups	0.13		0.10		0.11	
Urban residents, share	0.39		0.41		0.37	
Sample shares in regions						
Bishkek city	0.14		0.19		0.16	
Chui oblast	0.22		0.17		0.18	
North	0.18		0.18		0.17	
South	0.46		0.46		0.49	
No. of observations	3,987		7,345		6,385	
			Young sample, ages 25-34			
Individual's years of schooling	11.6	*2.0*	11.1	*2.1*	12.1	*2.8*
Parental years of schooling	7.3	*3.8*	8.5	*3.8*	10.8	*2.4*
University educated, share	0.14		0.13		0.27	
Age of individuals	29.4		29.4		29.1	
Female, share	0.50		0.49		0.51	
Shares by ethnic groups						
Kyrgyz	0.62		0.64		0.70	
Russians	0.11		0.13		0.08	
Uzbeks	0.16		0.14		0.11	
Other groups	0.11		0.10		0.12	
Urban residents, share	0.35		0.40		0.36	
Sample shares in regions						
Bishkek city	0.12		0.18		0.17	
Chui oblast	0.22		0.15		0.19	
North	0.18		0.17		0.16	
South	0.48		0.49		0.48	
No. of observations	1,176		2,066		1,622	

Sources: KMPS 1993, KPMS 1998, LiK 2011

Note: 1998 numbers are weighted.

Table 3.12: Estimations Based on Educational Categories

Variable / Year	1993	1998	2011	1993	1998	2011
	Total sample			*Young sample, aged 25-34*		
Spearman rank correlation	0.34	0.35	0.21	0.25	0.33	0.43
Regression: Highest parental educational level (*Secondary* is a reference group)						
Primary and lower	-1.9 ***	-1.8 ***	-0.2 ***	-0.6 ***	-0.7 ***	-1.1 **
Basic	-0.2	-0.3 ***	-0.3 ***	-0.6 ***	-0.5 ***	-0.8 ***
Post-secondary professional	0.4 **	0.9 ***	1.0 ***	0.3 *	0.7 ***	1.2 ***
University	1.2 ***	1.8 ***	2.1 ***	1.1 ***	1.7 ***	2.8 ***
Constant	11.5 ***	11.0 ***	11.2 ***	11.8 ***	11.0 ***	11.4 ***
No. of observations	3,942	7,345	6,385	1,176	2,064	1,622
Adj.R-squared	0.13	0.14	0.11	0.08	0.13	0.17

Sources: KMPS 1993, KPMS 1998, LiK 2011

Note: 1998 regression results are weighted. Spearman correlation is based on educational categories. In the regression, the dependent variable is the years of schooling of individuals; no other control variables are included. The regression coefficients are significant at 1% level when marked '***'; at 5% level when marked '**'; and at 10% level when marked '*'.

Table 3.13: Estimations Based on Gender and Paternal or Maternal Education

	Regression coefficient			Correlation		
	1993	1998	2011	1993	1998	2011
	Total sample of aged 20-69					
Male						
Both parents	0.21	0.20	0.13	0.33	0.33	0.22
Father	0.19	0.19	0.12	0.33	0.32	0.22
Mother	0.18	0.17	0.11	0.30	0.30	0.21
Female						
Both parents	0.32	0.33	0.21	0.44	0.47	0.33
Father	0.28	0.30	0.19	0.42	0.45	0.31
Mother	0.29	0.29	0.20	0.42	0.44	0.32
	Sample of aged 25-34					
Male						
Both parents	0.13	0.17	0.49	0.25	0.32	0.43
Father	0.12	0.16	0.39	0.24	0.31	0.38
Mother	0.10	0.14	0.38	0.22	0.27	0.39
Female						
Both parents	0.13	0.23	0.50	0.25	0.41	0.41
Father	0.11	0.20	0.42	0.24	0.37	0.38
Mother	0.11	0.20	0.40	0.22	0.39	0.36

Sources: KMPS 1993, KPMS 1998, LiK 2011.

Note: 1998 results are weighted. The regression specifications do not include any other control variables. All regression coefficients are significant at 1% confidence level.

Table 3.14: Estimations Based on Alternative Groups

	Regression coefficient			Correlation		
	1993	1998	2011	1993	1998	2011
(1) Young group extended to ages 20-34						
Aged 20-34	0.09***	0.18***	0.42***	0.18	0.32	0.37
Adj.R-squared	*0.03*	*0.10*	*0.14*			
No. of observations	*1,934*	*3,427*	*2,721*			
(2) Next youngest group, ages 35-44						
Aged 35-44	0.17***	0.21***	0.15***	0.39	0.34	0.26
Adj.R-squared	*0.09*	*0.11*	*0.07*			
No. of observations.	*919*	*1,749*	*1,322*			
(3) Without individuals enrolled in post-secondary study						
Aged 20-69	0.28***	0.27***	0.19***	0.40	0.40	0.29
Adj.R-squared	*0.16*	*0.16*	*0.09*			
No. of observations.	*3,905*	*7,176*	*6,105*			
Obs.excluded, %	*2.1*	*2.3*	*4.4*			
Aged 25-34	0.13***	0.21***	0.52***	0.27	0.37	0.43
Adj.R-squared	*0.07*	*0.14*	*0.16*			
No. of observations.	*1,160*	*2,031*	*1,598*			
Obs.excluded, %	*1.4*	*1.6*	*1.5*			
(4) Only individuals with education information for both parents						
Aged 20-69	0.27***	0.27***	0.18***	0.40	0.41	0.29
Adj.R-squared	*0.16*	*0.17*	*0.08*			
No. of observations	*3,536*	*7,234*	*6,061*			
Obs.excluded, %	*11*	*2*	*5*			
Aged 25-34	0.13***	0.21***	0.53***	0.27	0.37	0.44
Adj.R-squared	*0.07*	*0.13*	*0.19*			
No. of observations	*1,071*	*2,029*	*1,528*			
Obs.excluded, %	*9*	*2*	*6*			

Sources: KMPS 1993, KPMS 1998, LiK 2011

Chapter 4:

Are Uzbeks Better Off than Kyrgyz?
Measuring and Decomposing Horizontal Inequality

4.1. Introduction

Much of the literature on violent conflict has recently focused on horizontal inequalities, which are "inequalities in economic, social or political dimensions or cultural status between culturally defined groups" (Stewart, 2008: 3).[44] It is argued that horizontal inequalities enhance grievances and group cohesion among the relatively deprived and thus facilitate mobilization for violent conflict (Gurr, 2000; Stewart, 2008). It is recognized that it is not only resentment by the deprived that causes political instability. The relatively privileged can also attack the unprivileged, fearing that they may demand more resources and political power (Stewart, 2008). Quantitative research has generally confirmed a positive relationship between horizontal inequality and the onset of violent conflict, both for sub-national regions within countries and for cross-country comparisons (for example, Mancini, 2008; Østby, 2008b; Østby, 2008a; Murshed and Gates, 2005).

While several indicators have been proposed to measure horizontal inequalities (Mancini et al., 2008a), very little research intends to quantitatively analyze the sources of such inequalities. The Oaxaca-Blinder decomposition (Oaxaca, 1973; Blinder, 1973) is an appropriate technique to do so. It was originally applied in labor economics to explain wage gaps between groups, such as between women and men, or between blacks and whites. The decomposition determines how much of the wage gap can be attributed to differences in group characteristics and how much is due to differences in the coefficients, sometimes interpreted as discrimination. This technique is increasingly used to examine differences in living standards (in terms of either income or household expenditure) between ethnic groups in developing countries (Kijima, 2006; van de Walle and Gunewardena, 2001; Baulch et al.,

[44] Very similar is the concept of relative deprivation, which states that comparing oneself with those who do better may result in violence (Gurr 1970).

2007; Baulch et al., 2012; Gradín, 2009; Bhaumik et al., 2006; Gustafsson and Shi, 2003; Imai et al., 2011; Gang et al., 2008). None of these studies, however, discuss the relevance of inequality between ethnic groups for the outbreak of violent conflict. Bhaumik et al. (2006), analyzing the difference in per capita expenditure between Serbs and Albanians in Kosovo, is an exception. As they argue, it is imperative in a post-conflict situation that all ethnic groups feel having equal opportunities in economic and political terms. Hence, knowing more about the sources of inequality between ethnic groups may help policy-makers formulate the relevant policies in order to avoid further ethnic frictions.

In this chapter, we measure welfare differentials between two potentially conflictive ethnic groups, the Kyrgyz and the Uzbeks in Kyrgyzstan, and explain these welfare differentials by applying the Oaxaca-Blinder decomposition. In contrast to the mentioned studies on ethnic inequality, however, we do not only rely on standard welfare measures, such as household expenditure, but we discuss alternative measures as well. Expenditure (as well as income) may not be the most relevant indicator because it is not easily observable. We propose, instead, two more visible welfare measures, i.e. the ownership of assets and the value of the house, which are more likely to provoke envy and grievances among the relatively poorer group. This builds on Stewart (2008), who notes that it is not necessarily statistically measured inequality that drives people's action, but, rather, perceived inequality. We argue that such perception may be triggered by differences in some visible aspect of life and may then be assumed to hold for overall well-being.

We study the case of Kyrgyz and Uzbeks in Kyrgyzstan because violent clashes between these two ethnic groups in June 2010 left around 470 people dead. Uzbeks, who are today the second largest ethnic group in Kyrgyzstan after the Kyrgyz, are considered to be economically more prosperous than Kyrgyz, while being politically under-represented and discriminated against (Matveeva, 2010; Fumagalli, 2007b). Both academics and media reporting on the violence largely referred to the economic disparity between Uzbeks and Kyrgyz, even inferring that it was the root cause underlying the outbreak of the clashes. For example, the New York Times on June 14, 2010, reported: "*The most notable distinction, the one that is most responsible for the animosities that led to the recent violence, Central Asian experts say, is economic: Kyrgyz are traditional nomads, while Uzbeks are farmers. That divide has translated today into a wide class distinction, as Uzbeks have prospered and now own many of the businesses in southern Kyrgyzstan, which has engendered resentment*"

(Kramer, 2010). Bond and Koch (2010: 535) note that, "*Although the fighting was primarily between ethnic Kyrgyz and Uzbeks, the basis for much of the tension between the two groups is not ethnicity per se…, but rather economic and class differences.*" Such a portrayal implies that the violence is considered to be the result of horizontal inequalities and that Uzbeks are economically better off. This makes Kyrgyzstan a particularly interesting case to investigate, as it is the minority group that is supposedly better off; whereas in many other countries, in which ethnic inequality has been studied, it is the majority group that is privileged (van de Walle and Gunewardena, 2001; Baulch et al., 2007; Gustafsson and Shi, 2003; Gradín, 2009). As suggested by Chua (2003), countries with an economically dominant ethnic minority may be particularly subject to ethnic hatred and violent conflict.

Previous research on Kyrgyzstan shows that ethnicity is one of the factors that helps explain welfare differences between households in Kyrgyzstan. Beside household size, educational attainment, employment status, and residence in certain regions, ethnicity is usually found to be a significant determinant of welfare (measured as per capita expenditure), at least in some regions of the country and in some years (Ackland and Falkingham, 1997; Anderson and Becker, 1999; Anderson and Pomfret, 2000). However, all these studies use ethnicity dummies among several other variables in their welfare regressions, which only allows to interpret the ethnicity coefficients as a discrimination effect or cultural bias. None of them explicitly analyses welfare differences between ethnic groups.

In our empirical analysis we use household survey data from the Kyrgyz Integrated Household Survey (KIHS). We define three alternative welfare measures: (1) per capita household expenditure; (2) an asset index; and (3) the self-reported value of the house. For the most part, we restrict the empirical analysis to the south of Kyrgyzstan and to the two ethnic groups of Kyrgyz and Uzbeks. We find that Uzbeks do not differ much from Kyrgyz in terms of welfare, when measured by either per capita expenditure or asset indexes. Uzbeks have slightly lower expenditure in both urban and rural areas, which is primarily explained by differences in the characteristics of the two groups. Uzbeks also have slightly fewer assets than Kyrgyz in urban areas, but more in rural areas. They also report having more valuable houses in urban areas. The decomposition of these asset and house value gaps shows that they are not due to differences in the characteristics of Kyrgyz and Uzbeks but, instead, to structural differences.

The main contribution that we seek to make to the literature is twofold. First, the choice of welfare indicator may be decisive in studies on horizontal inequality. If we relied on expenditure and asset data, we would conclude that there is not much of a difference between the two groups, or that Uzbeks are worse off. However, Uzbeks do fare better in the most visible of our welfare indicators, house value. We argue that it is these visible aspects of life that are most likely to form the perceptions of people about another ethnic group's standard of living, which may, in turn, trigger violent conflict. Second, decomposing welfare differentials may be as important as determining them. The knowledge that one group is better off than another is an essential insight, but it leaves open where such inequality comes from and how it can be tackled. The Oaxaca-Blinder decomposition promises to be a useful tool for this purpose.

The remainder of this chapter is organized as follows. In the next section, we elaborate on the situation of the Uzbek community in Kyrgyzstan. We then present the data that we use for our empirical analysis. After that, we define a set of alternative welfare measures. Subsequently, we measure horizontal inequality between Kyrgyz and Uzbeks and decompose the welfare gap between the two ethnic groups. We summarize and discuss our results in the conclusion.

4.2. Uzbeks in Kyrgyzstan

Kyrgyzstan was among the most ethnically heterogeneous Soviet republics at the time of the collapse of the Soviet Union (Fumagalli, 2007b). In 1989, the three largest ethnic groups were the Kyrgyz (60 percent), Russians (16 percent), and Uzbeks (14 percent). Numerous other ethnic groups, including, among others, Dungans, Turks, Uigurs, and Tajiks, lived within the boundaries of what is today's Kyrgyzstan; but they accounted for marginal shares of the total population. Today, the Kyrgyz make up 71 percent, the Uzbeks 14 percent, the Russians 8 percent, and all other ethnicities are each around one percent or less (NSC, 2009c). The two largest minority groups are spatially concentrated: Uzbeks mainly live in the south of the country in the oblasts of Osh, Djalalabad and Batken - close to the border with Uzbekistan - while Russians mainly live in the north.

Traditionally, the Kyrgyz were a nomadic people engaged in animal breeding, whereas the Uzbeks were sedentary agriculturalists and urban-based craftsmen and traders (Fumagalli, 2007b; Tishkov, 1995; Spector, 2004; Matveeva, 2010). This implies a higher concentration of Uzbeks in the plains and of Kyrgyz in mountainous areas, which still prevails. Fumagalli (2007b: 216f.) calls this a "Soviet-induced balance between ethnic groups and ethnic stratification of labor". After the collapse of the Soviet Union, the Uzbeks are said to have "made the transition to business ownership more readily" (Bond and Koch, 2010: 535) than the Kyrgyz, which allegedly makes them form the core of a relatively more prosperous class in the south today. Many media reports reinforce this perception. Luke Harding (2010), writing for the Guardian, describes the Uzbeks as "better off than their once nomadic Kyrgyz counterparts, running most businesses and living in bungalows with courtyards and apricot trees". Countering the media, Matveeva (2010) calls the perception of richer and more privileged Uzbeks a stereotype. In the same manner, Melvin (2011) notes that ethnic differentiation in southern Kyrgyzstan is reinforced by the organization of the economy, i.e. Uzbeks in urban centers and Kyrgyz in rural areas, but he does not relate this to the eruption of violence. He merely claims that "growing economic pressures increasingly came to bear at ethnic contact points", such as markets (Melvin, 2011: 21).

It appears to be undoubtful that, whatever their economic position, Uzbeks are disadvantaged in the political and social spheres of life. After the collapse of the Soviet Union, president Askar Akayev showed to be committed to the ideology of a multiethnic society, as reflected in his slogan "Kyrgyzstan is our common home" (Matveeva, 2010; Fumagalli, 2007b; Melvin, 2011). At the beginning of his rule, improving ethnic relations was one of his priorities and he was able to build a broad coalition, which was inclusive of both nationalist factions as well as ethnic minorities (Fumagalli, 2007a; Melvin, 2011). For example, he formed the Assembly of the People of Kyrgyzstan, which drew together leaders from almost 30 ethnic communities and gave them a voice in the political process (Spector, 2004). However, over the course of his presidency he became more and more authoritarian and less concerned with equal opportunities for different ethnicities. For example, ahead of the 2000 presidential elections, he introduced a language law which required the president to speak the Kyrgyz language, thus disqualifying several challengers (Spector, 2004). Uzbeks were reportedly very concerned that an even more nationalist-oriented president might replace Akayev and thus supported him despite increasing frustrations and grievances (Fumagalli, 2007a; Spector, 2004; Melvin, 2011). When Bakiyev became president in 2005, the situation

of the Uzbek community deteriorated indeed, as he exposed open nationalist rhetoric and applied exclusive and non-transparent personnel politics in the south (Matveeva, 2010).

Since 1990, there have been two major episodes of violent conflict between ethnic Uzbeks and Kyrgyz. The first episode occurred in June 1990 when mass riots broke out in the city of Osh and neighboring areas. About 170 people (mostly Uzbeks) were killed, with many more injured (Tishkov, 1995). There was no single cause to the violence. One of the triggers was the fact that Uzbeks claimed the local government had awarded plots of land and housing disproportionately to Kyrgyz and that they had prematurely occupied the land (Bond and Koch, 2010). Additional factors seem to have been a struggle to gain control over power structures, increased social differentiation along city-village lines, and high rates of unemployment (Tishkov, 1995). After this episode of violence, the Uzbek community in Kyrgyzstan was initially considered "a potential hotbed for conflict" (Fumagalli, 2007b: 214). To what extent this is true is debatable. Data from the Survey of Conflict Prevention and Cooperation conducted by the World Bank in 2004 show that three quarters of the sampled households (or, 78 percent of Kyrgyz households and 73 percent of Uzbeks households in the sample) reported somewhat good or very good relations among people of different ethnic groups. Further, 57 percent of the sample (54 percent of Kyrgyz and 74 percent of Uzbeks) stated that conflict within the country over the next few years was not likely at all. Only two percent said that conflict was highly likely.

The second major episode of violence occurred in June 2010 in Osh, in which around 470 people were killed; the majority Uzbeks. About 400,000 fled temporarily from their homes, partly to neighboring Uzbekistan, and a large number of properties were destroyed (Bond and Koch, 2010; Melvin, 2011; Kyrgyzstan Inquiry Commission, 2011).[45] The cause of these events is not entirely clear as the conflict did not appear to be spontaneous but may have been triggered by a series of coordinated attacks carried out by separate groups of armed men. In the beginning, Kyrgyzstan's interim government, under the leadership of Roza Otunbayeva, accused Bakiyev, who was ousted that April and had fled to Belarus, of having organized the clashes in order to destabilize the new government. No evidence has been presented to support this claim (Melvin, 2011).

[45] The exact number of victims and refugees is controversial. Different sources provide different numbers.

The conclusion of a national commission formed by the then interim government states that Uzbek community leaders and members of the Bakiyev regime were responsible for the violence (Osmonov, 2011). An Independent International Commission of Inquiry did not identify any individuals responsible for the crimes. However, it emphasizes the awkward political situation that followed Bakiyev's ouster, during which followers of the interim government, supporters of the Bakiyev regime, and Uzbek community members struggled for power. It refers to a number of situations in which Uzbek community leaders demanded more political representation of Uzbeks, which was misunderstood by some as a demand for autonomy (Kyrgyzstan Inquiry Commission, 2011). Human Rights Watch reports that Uzbek and Kyrgyz crowds clashed following a fight between several men of both ethnic groups, with Uzbeks responsible for many of the initial attacks. Later, the balance reportedly shifted and ethnic Kyrgyz descended on Uzbek neighborhoods, which made the events an 'interethnic conflict' (Human Rights Watch, 2010). Melvin (2011: 26) objects to this view and calls the events "an incident of ethnic violence within a broader conflict", which involves a wide range of political forces and social groups. He puts much weight on the rise of Kyrgyz nationalism. Yet, he acknowledges that once fighting started ethnicity became a defining factor of the violence, which reflected underlying tensions between the two communities.[46]

4.3. Data

The data we use in this chapter is from the Kyrgyz Integrated Household Survey (KIHS), which is conducted by the National Statistical Committee (NSC) of the Kyrgyz Republic. This survey annually covers close to 5,000 households since its inception in 2003. The sampling procedure is stratified, multistage random sampling, and the survey is representative at the national, rural/urban, as well as oblast (province) levels. There are 15 strata in total, corresponding to the urban as well as rural areas of the seven oblasts plus the capital. The KIHS includes information on demographics, education, health, internal

[46] It is debated whether the two mentioned incidents can be referred to as 'interethnic conflict' (Tishkov, 1999). In fact, the first reports about the 1990 events were not referred to as a conflict between Uzbeks and Kyrgyz but rather as the 'Osh conflict' (1999; Tishkov, 1995). As mentioned, the 2010 violence seemed to be organised and triggered by a series of attacks by several groups of armed men. Nevertheless, in both cases the incidents took an interethnic turn and manifested themselves along ethnic lines (Fumagalli, 2007b).

migration, employment, household expenditure, income, housing conditions, and assets. We were provided by NSC with KIHS data for all years between 2003 and 2010.

In our empirical analysis, we use data for the years 2005, 2007, and 2009 – all these years are pre-2010 observations, which is important as violence in 2010 is highly likely to have affected the welfare distribution in the population, at least in the southern part of the country. Importantly for us, information on ethnicity was collected in the KIHS only through 2005.[47] However, the survey is a rotating panel, with a maximum substitution of 25 percent of households in each year. We assign the ethnicity reported in 2005 to those households that are part of the panel sub-samples in later years. Thereby, we can identify the ethnicity of 70 percent (3,384 out of a total of 4,803 households) of the 2007 sample and 57 percent (2,821 out of a total of 4,984 households) of the 2009 sample. We test for the prevalence of attrition bias following the example of Falaris (2003). Unlike Falaris, who used longitudinal data for Peru, Côte d'Ivoire and Vietnam, we find that there are differences in the slopes of the coefficients between stayers and attritors when we run welfare equations in the form of the below equation (4.2). This means that attrition is not random and that our 2007 and 2009 sub-samples are no longer representative of the total population. Thus, we cannot draw conclusions for the population at large, but only for stayers. We identify in what respects these stayers differ from attritors by estimating attrition equations as in Fitzgerald et al. (1998). Stayers are more likely than attritors to live in rural areas and to be engaged in agriculture. They also tend to have more children and older household heads.

In terms of ethnicity, which is self-reported in the KIHS, we distinguish between Kyrgyz, Uzbek and Russian-headed households and pool all other ethnic groups. Households in Kyrgyzstan tend to be monoethnic. Based on KIHS data, among the households headed by Kyrgyz, 98 percent are married to Kyrgyz. Among Russian and Uzbek headed families, the share of intra-ethnic marriages is about 90 percent. Therefore, we consider the ethnicity of the household head to be a reliable proxy for the ethnicity of all other household members.

Table 4.1 illustrates the distribution of sample households in the respective years in rural and urban areas as well as in the north (composed of Chui, Issyk-Kul, Naryn, and Talas oblasts as well as Bishkek city) and south (composed of Batken, Jalal-Abad and Osh oblasts) of the

[47] In informal talks with experts close to NSC, we were told that ethnicity information was no longer collected because it was considered to be politically too sensitive.

country. It becomes clear that Uzbek households are concentrated in the south, while Russians and other ethnic groups mostly live in the north. Since we are interested in the economic differences between Uzbeks and Kyrgyz, we restrict most of the below measurement and decomposition of welfare differentials to the south, while omitting Russians and others. We thereby assume that, for any grievances potentially leading to violent conflict, it is only these differences between Uzbeks and Kyrgyz residing in the south that matter. In the context of strong internal migration (Ablezova et al., 2009; UNDP, 2009), this may not seem to be a convincing assumption. We release the assumption and make use of the data from the entire country in the sensitivity section.

Table 4.1: Geographic Distribution of Households in the KIHS Sample, 2005-2009
Sample size and percentage to total (in italic)

	Kyrgyz		**Russian**		**Uzbek**		**Other**	
				2005				
South								
Urban	574	*12.4*	81	*1.7*	279	*6.0*	80	*1.7*
Rural	593	*12.8*	2	*0.0*	104	*2.2*	19	*0.4*
North								
Urban	1.087	*23.4*	520	*11.2*	30	*0.6*	160	*3.4*
Rural	849	*18.3*	166	*3.6*	9	*0.2*	87	*1.9*
Total (∑ = 4,640)	**3,103**	***66.9***	**769**	***16.6***	**422**	***9.1***	**346**	***7.5***
				2007 (sub-sample)				
South								
Urban	369	*11.2*	42	*1.3*	193	*5.8*	55	*1.7*
Rural	520	*15.7*	1	*0.0*	96	*2.9*	16	*0.5*
North								
Urban	729	*22.1*	323	*9.8*	19	*0.6*	115	*3.5*
Rural	654	*19.8*	101	*3.1*	8	*0.2*	63	*1.9*
Total (∑ =3,304)	**2,272**	***68.8***	**467**	***14.1***	**316**	***9.6***	**249**	***7.5***
				2009 (sub-sample)				
South								
Urban	269	*9.9*	35	*1.3*	167	*6.1*	41	*1.5*
Rural	448	*16.5*	1	*0.0*	90	*3.3*	16	*0.6*
North								
Urban	595	*21.9*	252	*9.3*	17	*0.6*	85	*3.1*
Rural	566	*20.8*	80	*2.9*	5	*0.2*	56	*2.1*
Total (∑ = 2,723)	**1,878**	***69.0***	**368**	***13.5***	**279**	***10.2***	**198**	***7.3***

Source: Authors' illustration based on KIHS data.

Throughout this chapter, we specify survey settings, such as strata and primary sampling units. However, for most of the calculations, we do not use sampling weights even though the KIHS data includes such information. Those weights appear questionable to us as they increased substantially between 2003 and 2005, relatively more so for Uzbeks than for the other ethnic groups, and then stayed much higher for this particular ethnicity.[48] We were told by NSC that the calculation of weights takes into consideration the sampling probability of primary sampling units in each stratum and the sampling probability of households in these units. These weights are then modified in order to give a realistic picture of different age groups (children, working age adults, elderly) in society, but they reportedly do not control for ethnicity. A disproportionate increase of weights for Uzbek households would then only make sense, if the age structure of Uzbeks changed dramatically over time, if the number of Uzbeks decreased in the sample, or if Uzbek households became smaller and smaller. None of these options is the case and, hence, we prefer not to use weights in order to ensure that they do not influence our results in undesirable ways. This implies, of course, that the below estimates, especially the descriptive statistics, are not representative for the total population but only for the sampled households. However, we are already using non-random sub-samples for these years, so we cannot obtain representative figures for 2007 and 2009. Nevertheless, whether or not ethnicity is related with welfare should not be affected. In the below sensitivity section, we repeat our main analysis with the use of weights.

4.4. Measurement of Welfare

In this section, we define three alternative measures of welfare and describe how they are constructed. Our first indicator is per capita household expenditure, which is the most commonly applied welfare measure in developing countries and which has also been widely used in other studies of ethnic inequality. However, we argue that, for the purpose of this chapter, expenditure may not be the most appropriate measure of welfare because it is not easily observable to others and, hence, perceptions may not come about on the basis of expenditure levels. Instead, perceptions about welfare levels may be formed on the basis of

[48] For example, the average weight for the Uzbek group increased by a factor of 4.9 between 2003 and 2005, while the average weight for the other ethnic groups increased by about 2.7.

more visible goods, such as household assets.[49] Our second measure is therefore an asset index in the sense of Sahn and Stifel (2000; 2003) and Filmer and Pritchett (2001). Given that the components of a typical asset index (such as ownership of refrigerators or radios) may still not be publicly visible (though more visible than expenditure), we consider the self-reported value of the house as a third welfare measure. People can easily assess the features of houses of others, even of strangers, which makes this measure of welfare particularly relevant for studies of horizontal inequality.

Per capita expenditure of households is calculated on the basis of very detailed information in the KIHS. We construct the consumption aggregate underlying our welfare measure in line with standard practice (Deaton and Zaidi, 2002). It comprises food and non-food consumption. Food consumption is the monetary value of consumed food, which comprises of purchased food products, home-produced food products, and food received as gifts. The nominal food consumption of households is deflated by the food price Paasche index, which takes into consideration regional and urban/rural price differences.[50] Non-food consumption includes expenditures on clothing, utilities, services, and other recurrent non-food items. Housing rents and expenditures on durable goods are excluded from the consumption aggregate, but the user value of owned durable goods is part of it. The consumption aggregate does not control for economies of scale. We obtain per capita expenditure by dividing the consumption aggregate by the number of household members.[51,52]

Our asset index is constructed using 17 components that represent ownership of key durables (i.e. music player, color TV, video recorder/player, photo camera, washing mashine, vacuum cleaner, auto and motor transport, fridge, bedroom furniture, kitchen furniture, cell phone, and landline phone), housing conditions (i.e. central heating, access to clean water, and clean

[49] This borrows from the literature on conspicuous consumption, which argues that the consumption and display of particular, so called conspicuous, goods communicates information about economic and social status (Charles et al., 2009). Conspicuous goods are those goods whose consumption is easily observable in anonymous social interactions (Veblen, 1924; Charles et al., 2009).

[50] For each year, we calculated a regional price difference for 15 different regions, corresponding to the 15 strata used for sampling.

[51] Respondent households keep diaries of food expenditure and consumption for 14 days each quarter of the year. Some households drop out of the sample in the course of the year so that there is information for them for less than four quarters. We do not impute information for them but delete them from the sample.

[52] Using per capita expenditure instead of per adult equivalent expenditure is the common practice of welfare measurement in Kyrgyzstan by NSC and the World Bank.

toilet), and access to basic infrastructure (reliable energy supply and less than five minutes walk to the nearest bus station). We apply a principal component analysis to construct our index, in line with Filmer and Pritchett (2001). We execute a linear transformation of the asset index in order to have a more standardized measure, which is anchored at a minimum of one.

The house value is the self-assessed sales price of a household's dwelling at the time of the interview.[53] More than 90 percent of households in Kyrgyzstan own the dwelling they live in, so there is a good chance that people indeed know their house's value. In the data, the households' assessment of the house price in urban areas seems to be accurate when compared to actual market prices, as, for example, reported on the real estate site of the information portal *allkyrgyzstan*.[54] However, given that two thirds of the population live in rural areas, where the house market functions more poorly, we cannot be certain that the self-assessed price reflects the factual value in these areas. Hence, we will first run all house value estimations using rural and urban areas together and then distinguish between them in the sensitivity section.[55] A clear distinction between urban and rural areas is indispensable for another reason as well: Kyrgyz and Uzbeks have largely separate housing markets in urban areas. Uzbeks usually live in so-called mahallas, which are made up by numerous detached houses that are home to, potentially, several families. Very few Kyrgyz live in these mahallas, but, instead, they mostly live in multi-storey apartment buildings in other areas of the towns (Liu, 2012). We discuss the implications of such geographic segregation of the housing situation, which does not exist in rural areas, below.

Table 4.2 provides descriptive statistics for the three welfare measures. For the two monetary measures, i.e. household expenditure and house value, we calculated real values (in 2005 prices). We also excluded outliers, which we defined as those welfare values greater than three standard deviations from the mean. As the table shows, all welfare measures increased

[53] We considered using the value of automobiles in addition, since these are very visible and potentially status signalling goods as well. However, the share of households that reported to have an automobile is very low; it ranges from 11 percent in 2005 to 18 percent in 2009.

[54] See http://www.allkyrgyzstan.com/business/real-estate.htm (accessed on October 12, 2012).

[55] Non-reporting, comprising both refusals and difficulties to assess the house value, varies from 3 to 21 percent across the years. However, we do not find any pattern in non-reporting: Both rural and urban households are equally likely to not report; non-reporting does also not depend on gender, ethnicity, age, or educational level of the household head.

on average over time. House values, in real terms, apparently increased dramatically over the period of interest, which is confirmed by UNECE (2010). The table also reports the pairwise correlations between our welfare measures. The association between per capita expenditure and the asset index is between 36 and 42 percent over the years. The correlation between per capita expenditure and house values is substantially lower and ranges from 21 to 31 percent. The asset index and the house value are correlated to a larger extent, between 37 and 45 percent.

Table 4.2: Descriptive Statistics for Welfare Measures
Full sample

	Mean	***SD***	***Median***	***Min***	***Max***	***Correlation***			***No. of obs.***
						PCE	***AI***	***HV***	
				2005					
Per capita expenditure (PCE) per day, Soms	37.1	19.0	31.8	6.7	107.8	1			4,640
Asset index (AI), standardised	2.60	0.98	2.41	1.00	6.37	0.419*	1		4,629
House value (HV), '000 Soms	230.0	236.1	150.0	1.0	1,100.0	0.257*	0.445*	1	3,646
				2007 sub-sample					
PCE per day, Soms	49.5	25.5	42.4	12.3	150.6	1			3,304
AI, standardised	2.73	0.97	2.58	1.00	6.27	0.421*	1		3,297
HV, '000 Soms	452.8	508.5	293.0	2.0	4,394.5	0.308*	0.404*	1	2,753
				2009 sub-sample					
PCE per day, Soms	74.4	34.0	65.9	14.1	203.6	1			2,723
AI, standardised	2.85	0.98	2.73	1.00	6.04	0.359*	1		2,707
HV, '000 Soms	549.0	503.2	378.1	6.8	3,828.0	0.213*	0.374*	1	2,344

Source: Authors' calculation based on KIHS data.
Note: No survey settings are taken into account here. The expenditure and house value data are in 2005 prices.
*- significant at 1 percent level.

4.5. Determining and Decomposing Welfare Differentials

In this section, we identify potential welfare differentials between Kyrgyz and Uzbeks, then apply the Oaxaca-Blinder (Oaxaca, 1973; Blinder, 1973) decomposition in order to shed some light on the sources of such differentials. The basic idea of this method is to decompose

the mean welfare gap between two groups into a component attributable to differences in the observed characteristics of the groups (characteristics effect, or endowments effect) and a component attributable to between-group differences in the returns to given individual characteristics (coefficients effect, or discrimination). Following Neumark (1988), the decomposition, based on OLS regression of welfare functions, is as follows:

$$\bar{W}_K - \bar{W}_U = \beta(\bar{X}_K - \bar{X}_U) + [\bar{X}_K(\beta_K - \beta) - \bar{X}_U(\beta_U - \beta)] \quad (4.1)$$

(Total difference = Characteristics effect + Coefficients effect)

where $\bar{W}$ represents mean welfare, usually measured in logarithmic terms, $\bar{X}$ is a vector of the mean characteristics, and β are the regression coefficients, which reflect the returns to a unit change in characteristics. The subscripts K and U indicate Kyrgyz and Uzbek, respectively. The first term on the right-hand side of equation (4.1) is the characteristics effect, and the second term the coefficients effect.

The underlying welfare function takes the simple form

$$W_{ig} = \beta_g X_{ig} + \varepsilon_{ig} \quad (4.2)$$

where W_{ig} indicates welfare of household i belonging to ethnic group g (g = Kyrgyz, Uzbek), X_{ig} is the vector of household characteristics of household i belonging to group g, and ε_{ig} is the error term. Essentially, this function is estimated separately for Kyrgyz and Uzbeks, which provides the parameter estimates β_K and β_U. The function is additionally estimated with the sample of Kyrgyz and Uzbeks pooled together in order to obtain the parameter β. These three parameter estimates as well as the group means for welfare and the household characteristics are then used to perform the decomposition of equation (4.1).

In a first step, we estimate equation (4.2). As explanatory variables, we include variables that are identified in the literature as important and statistically significant determinants of living standards in Kyrgyzstan (Anderson and Pomfret, 2000; Ackland and Falkingham, 1997; Anderson and Becker, 1999). Specifically, we control for age and gender of the household head, and household composition (number of pre-school children, school children, working age adults, and elderly members). With regard to human capital, we use the average of

schooling years of all adult household members.[56] We consider this to better reflect the stock of human capital of households than education of the household head only, as many heads are relatively old. We control for the hours per week worked in services per employed household member. We also control for the ownership of irrigated and cultivated land (in hectares) as well as ownership of livestock. With regard to the latter, we calculate sheep equivalent units (SEU) in order to be able to express different types of livestock in a common unit.[57] We include dummy variables for rural areas as well as the main administrative regions in the south of the country, i.e. Batken, Jalalabad, and Osh oblasts. Table 4.5 in Appendix outlines the definitions of these variables. Table 4.6 provides survey means for these variables for the total population of the south of Kyrgyzstan as well as for Kyrgyz and Uzbeks separately.

In Table 4.3, we provide the results for estimating equation (4.2) using OLS regression. By running the regressions for Kyrgyz and Uzbeks, we allow the coefficients to differ for the two groups. We estimate equation (4.2) for 2005, 2007, and 2009, as well as for the pooled sample (including year dummies). Given that the results do not differ by much, Table 4.3 reports the pooled results for the sake of simplicity. In general, our results are in line with previous research in the sense that household composition, educational attainment, employment status, and residence in certain geographical areas are the most significant determinants of household welfare in Kyrgyzstan. However, these variables, together with the other control variables included, explain differences in per capita expenditure much better than differences in assets and the house value. Whereas the R-squared is about 67 percent in the first case, it is between 23 and 42 percent in the other cases, which are still reasonable values for cross-sectional estimations with such a sample size. Chow tests reject identical parameters for all three welfare measures ($F = 3.73$ for expenditure, $F = 3.07$ for asset index, $F = 2.81$ for house value), which means that Kyrgyz and Uzbeks have significantly different coefficients.

[56] Years of education were inferred from the level of education obtained. We take the schooling reform of 1989 into consideration, as this increased primary and secondary schooling to last 11 years, up one year from the previous ten.

[57] Livestock units are an exchange ratio among livestock species obtained by converting the body weight into the metabolic weight. We use the sheep equivalent units scale from the World Bank's Livestock Review 2007 for Kyrgyzstan and adjust the scales for other types of animals using the Mongolian case. The equivalence scale is in line with the concept of tropical livestock units, which are often used for African countries. On this matter, see http://www.fao.org/ag/againfo/programmes/en/lead/toolbox/Mixed1/TLU.htm. The standard used for one SEU is one sheep. Five sheep correspond to one cattle.

Table 4.3: OLS Regression Results for Welfare Functions

South sample only; pooled data for the years 2005, 2007, and 2009

	(1) Per capita expenditure (log)		***(2) Asset index (log)***		***(3) House value (log)***	
	Kyrgyz	***Uzbek***	***Kyrgyz***	***Uzbek***	***Kyrgyz***	***Uzbek***
Preschool children	-.188	-.129	-.00264	-.0268	-.0436	.00982
	(-16.31)***	(-10.20)***	(-0.22)	(-1.84)*	(-1.77)*	(0.35)
School age children	-.155	-.155	-.0171	-.0236	.00547	.0443
	(-20.16)***	(-8.60)***	(-3.16)***	(-3.04)***	(0.39)	(1.22)
Adults	-.1	-.0959	.0115	.0103	.0671	.0294
	(-10.81)***	(-7.42)***	(1.25)	(1.00)	(3.01)***	(1.20)
Elderly	-.141	-.118	.0371	-.00153	.0708	-.0371
	(-6.33)***	(-4.40)***	(1.73)*	(-0.05)	(1.05)	(-0.51)
Age of HH head	.00204	.000182	.00281	.00368	.00197	.00439
	(2.18)**	(0.12)	(2.71)***	(2.26)**	(0.77)	(1.30)
Female HH head	-.0287	-.0528	-.0359	-.0342	-.0582	-.0871
	(-1.50)	(-1.79)*	(-2.38)**	(-1.10)	(-1.38)	(-1.32)
Average years of schooling of adults	.0286	.0223	.0515	.0588	.0706	.02
	(6.13)***	(4.53)***	(9.30)***	(6.49)***	(3.91)***	(2.23)**
Hours/week worked in services	.00169	.00213	.00194	.00145	.00148	.00294
	(3.32)***	(2.53)**	(3.33)***	(3.19)***	(0.79)	(1.54)
Area of cultivated and irrigated land	.000807	-.00446	.0013	-.013	.0036	-.0194
	(0.96)	(-0.81)	(1.63)	(-2.37)**	(1.32)	(-1.14)
Sheep equivalent unit	.00469	.0072	.00165	-.000062	.00135	.00278
	(5.21)***	(4.45)***	(3.03)***	(-0.02)	(0.85)	(0.56)
Rural	-.097	-.00361	-.371	-.131	-.0558	.0465
	(-2.94)***	(-0.10)	(-6.08)***	(-2.20)**	(-0.34)	(0.26)
Djalalabad	-.189	-.0749	.0651	-.022	-.431	-.548
	(-5.40)***	(-2.18)**	(0.77)	(-0.33)	(-1.83)*	(-2.16)**
Batken	-.0146	-.087	-.0109	-.191	-.149	-.468
	(-0.38)	(-1.29)	(-0.15)	(-1.66)	(-1.05)	(-2.54)**
R-squared	0.660	0.667	0.420	0.307	0.231	0.264
Observations	2,766	929	2,755	925	2,370	831

Note: Cell entries are coefficients; t-values are in brackets. *** -significant at 1% level, ** - at 5% level, * - at 10% level. Calculation of standard errors takes clustering at the community level into account. Year dummies and a constant are included. Osh is the reference for oblasts.
Source: Authors' calculation based on KIHS data.

In a next step, we therefore perform the decomposition of equation (4.1) in order to determine the magnitude of the welfare differentials between Kyrgyz and Uzbeks and to investigate how much of these differentials are due to differences in characteristics and how much are

due to differences in the coefficients (In contrast, the difference in the house value cannot be well explained by differences in characteristics. Here, it is differences in the coefficients between the two groups that account for the welfare differential. If Kyrgyz and Uzbeks had the same coefficients, the differential in the (log) house value would be only 14.3 percent of -0.4934 in the year 2005. In the later years, the characteristics effect still looses in relevance, and in 2009, even becomes negative. This implies that, if Kyrgyz and Uzbeks had the same coefficients, the differential in the (log) house value would turn around, and it would now be Kyrgyz households that would have higher house values. We cannot rule out that this time trend is because of the non-random sub-samples of 2007 and 2009, which we investigate further in the below sensitivity section. Furthermore, as pointed out, we are aware that there is large potential for misreporting in the house value data, especially for rural areas. Hence, we analyse the decomposition results for urban areas alone below.

Table 4.4). We report the results separately for the three welfare measures and do not pool the data here but, instead, run the decomposition for each one of the three years of interest. We first focus on the differentials per se. We report the difference in the welfare means between the two groups as the mean for Kyrgyz minus the mean for Uzbeks. Hence, a positive difference implies that Kyrgyz are better off than Uzbeks, and a negative difference implies the opposite. We obtain a consistent picture over time: (1) expenditure of Uzbeks is lower compared with that of Kyrgyz and this difference is statistically significant in two out of three years, (2) Uzbeks have more assets than Kyrgyz, and this gap is statistically significant in two out of three years, and (3) the value of houses is higher for Uzbeks compared with that of Kyrgyz, and this is statistically significant in all years.

Given that we here analyse urban and rural households together, it could be that these identified differences, and in particular the ethnic gap in house values, are driven by the fact that the majority of Uzbeks live in urban areas, while Kyrgyz tend to live more in rural areas (see Table 4.1). We therefore repeat the exercise separately for rural and urban areas (columns (2) and (3) of Table 4.7). In urban areas, per capita expenditure and the asset index of Uzbeks are lower than those of Kyrgyz. In rural areas, Uzbeks have higher asset indexes but lower expenditure compared with Kyrgyz. Again, this pattern is consistent over time, even though the welfare gaps are not in all cases statistically significant. The house values of Uzbeks are clearly higher than those of Kyrgyz in both urban and rural areas. However, there

are only few observations for rural Uzbeks in the sample, and so, measurement error seems highly likely.

When we look at the magnitude of the welfare differentials, it is clear that the most striking difference between Kyrgyz and Uzbeks is that the latter have much more valuable houses. We here elaborate on possible explanations for this stark house value differential. On the one hand, it could, of course, be that the observed differential is due to systematic misreporting of one of the ethnic groups. Either Kyrgyz may report house values that are too low, or Uzbeks may report house values that are too high. On the other hand, it could be that the differential is real and that it stems from supply constraints in the Uzbek housing market (for example, in the form of discrimination in the provision of construction permits for houses in mahallas), from a different way of construction of Uzbek houses (for example, in the form of using more expensive, anti-seismic material), or from the fact that Uzbeks have larger dwellings than Kyrgyz. The latter point appears most likely, at least for the case of urban areas, where Uzbeks tend to live in houses and Kyrgyz in apartments, as mentioned above. We therefore compare the total area of the dwelling, the living area of the dwelling, the number of rooms as well as the per capita total area of the dwelling of Kyrgyz and Uzbek households. We report these for the year 2005 and disregard the other years, because there are essentially no changes over time.

We find that Uzbeks indeed have larger houses than Kyrgyz in urban areas, whereas there is no difference in rural areas (Table 4.8). Uzbek urban houses are significantly larger and have more rooms. This is a very visible aspect of people's standard of living, which can easily drive perceptions about interethnic welfare differentials and enhance grievances among the relatively deprived group. It must be noted, however, that Uzbek households are on average larger, such that the per capita house area is not significantly different from that of Kyrgyz households. Importantly, this does not translate into a loss of significance in the per capita value differential. The house value is still significantly different between Uzbeks and Kyrgyz when we compare it in per capita terms (not reported). It may seem surprising that Uzbeks have (absolutely) larger and more valuable houses, even though they fare worse in terms of household expenditure. A Central Asian proverb may help explain this: "*When a Kyrgyz man becomes rich, he takes a second wife. When an Uzbek man becomes rich, he builds a second house*." This proverb implies that Uzbeks have strong preferences for investing in their houses, whereas Kyrygz may prefer to spend their resources on other ends.

We now turn to the Oaxaca-Blinder decomposition results in In contrast, the difference in the house value cannot be well explained by differences in characteristics. Here, it is differences in the coefficients between the two groups that account for the welfare differential. If Kyrgyz and Uzbeks had the same coefficients, the differential in the (log) house value would be only 14.3 percent of -0.4934 in the year 2005. In the later years, the characteristics effect still looses in relevance, and in 2009, even becomes negative. This implies that, if Kyrgyz and Uzbeks had the same coefficients, the differential in the (log) house value would turn around, and it would now be Kyrgyz households that would have higher house values. We cannot rule out that this time trend is because of the non-random sub-samples of 2007 and 2009, which we investigate further in the below sensitivity section. Furthermore, as pointed out, we are aware that there is large potential for misreporting in the house value data, especially for rural areas. Hence, we analyse the decomposition results for urban areas alone below.

Table 4.4. As mentioned above, the difference in mean welfare is not in all cases statistically significant and, hence, we do not interpret the decomposition results of these insignificant differentials. With regard to the significant differentials, we find that differences in the characteristics between Kyrgyz and Uzbek households make up for most of the mean gap in expenditure and assets. For example, the positive characteristics effect for expenditure in 2007 implies that, if Kyrgyz and Uzbeks had the same OLS coefficients, the (logarithmised) welfare differential would be 81 percent of 0.0855, solely due to differences in characteristics. If, in contrast, they had the same characteristics, about four fifths of the welfare differential would disappear.

In contrast, the difference in the house value cannot be well explained by differences in characteristics. Here, it is differences in the coefficients between the two groups that account for the welfare differential. If Kyrgyz and Uzbeks had the same coefficients, the differential in the (log) house value would be only 14.3 percent of -0.4934 in the year 2005. In the later years, the characteristics effect still looses in relevance, and in 2009, even becomes negative. This implies that, if Kyrgyz and Uzbeks had the same coefficients, the differential in the (log) house value would turn around, and it would now be Kyrgyz households that would have higher house values. We cannot rule out that this time trend is because of the non-random sub-samples of 2007 and 2009, which we investigate further in the below sensitivity section. Furthermore, as pointed out, we are aware that there is large potential for misreporting in the

house value data, especially for rural areas. Hence, we analyse the decomposition results for urban areas alone below.

Table 4.4: Oaxaca-Blinder Decomposition of Welfare Differences Between Kyrgyz and Uzbeks
South sample only

	Difference in mean (Kyrgyz minus Uzbeks)	***Characteristics effect***	***Share of total difference***	***Coefficients effect***	***Share of total difference***	***Number of observations***
			(Log) Per capita expenditure			
2005	0.0529	0.0459	86.8	0.0070	13.2	1,550
	(1.41)	(1.51)		(0.21)		
2007	0.0855***	0.0692**	80.9	0.0163	19.1	1,178
	(2.73)	(2.33)		(0.56)		
2009	0.0200	0.0279	139.6	-0.0079	-39.6	974
	(0.52)	(.85)		(-0.22)		
			(Log) Asset index			
2005	-0.0967**	-.0497	51.4	-.0470	48.6	1,545
	(-2.23)	(-1.29)		(-1.36)		
2007	-0.0626	-0.0525	83.9	-0.0101	16.1	1,173
	(-1.40)	(-1.43)		(-0.25)		
2009	-0.0899**	-0.0777*	86.4	-0.0121	13.6	968
	(-2.03)	(-1.81)		(-0.32)		
			(Log) House value			
2005	-0.4934***	-0.0707	14.3	-0.4227***	85.7	1,221
	(-3.11)	(-0.60)		(-3.06)		
2007	-0.458***	-0.0165	3.60	-0.4415***	96.4	1,077
	(-3.88)	(-0.19)		(-3.67)		
2009	-0.4461***	0.0266	-6.0	-0.4727***	106.0	907
	(-5.25)	(0.68)		(-5.45)		

Note: *** - difference in the means is significant at 1% level, ** - at 5% level, * - at 10% level.
Source: Authors' calculation based on KIHS data.

Summarizing what we find so far, Uzbeks do not unequivocally differ from Kyrgyz in terms of per capita expenditure as well as assets. However, when they differ, Uzbeks have lower expenditure, but more assets. In both cases, the decomposition shows that these welfare differentials are mostly due to differences in the characteristics of the groups. If Kyrgyz and Uzbeks had the same characteristics, the welfare differential would (almost) disappear. In contrast, Uzbeks report clearly higher house values than Kyrgyz, and this is always statistically significant. This particular welfare differential is not due to characteristics but, instead, to differences in the coefficients of Kyrgyz and Uzbeks.

4.6. Sensitivity

In the following, we run a number of sensitivity checks to see whether these results hold when we take sampling weights into account and use different samples. We limit ourselves to reporting the main results of the Oaxaca-Blinder decomposition, namely the difference in mean welfare and the contributions of the characteristics effect as well the coefficients effect to this difference (Table 4.7). Column (1) reproduces our basic results from In contrast, the difference in the house value cannot be well explained by differences in characteristics. Here, it is differences in the coefficients between the two groups that account for the welfare differential. If Kyrgyz and Uzbeks had the same coefficients, the differential in the (log) house value would be only 14.3 percent of -0.4934 in the year 2005. In the later years, the characteristics effect still looses in relevance, and in 2009, even becomes negative. This implies that, if Kyrgyz and Uzbeks had the same coefficients, the differential in the (log) house value would turn around, and it would now be Kyrgyz households that would have higher house values. We cannot rule out that this time trend is because of the non-random sub-samples of 2007 and 2009, which we investigate further in the below sensitivity section. Furthermore, as pointed out, we are aware that there is large potential for misreporting in the house value data, especially for rural areas. Hence, we analyse the decomposition results for urban areas alone below.

Table 4.4. In column (2), we present the decomposition results for urban households and in column (3) for rural households. In terms of expenditure, Uzbeks are confirmed to be worse off than Kyrgyz, in both urban and rural areas, and most of this welfare gap is again found to be due to differences in the characteristics of the two ethnic groups. The decomposition results for assets, separately for urban and rural areas, are very different from those in column (1). Whereas we previously showed that asset differentials are due to a characteristics effect, we now see that, when we perform the decomposition separately for urban and rural areas, they are, instead, due to differences in the coefficients of Kyrgyz and Uzbeks. This is puzzling at first glance. However, it can be explained by the fact that Uzbeks are better off than Kyrgyz in rural areas but worse off in urban areas. Pooling urban and rural areas then leads to misleading decomposition results.

Turning to the house value differential, we do not pay much attention to the results for rural areas, because, as we previously noted, we cannot be sure about the reliability of the self-reported house values of rural households. For urban areas, we find that the coefficients effect

is still larger than the characteristics effect, but it is now substantially lower in 2005 and 2007 than in our basic results. In 2005, the coefficients effect makes up close to two thirds of the total difference in house values. This means that, if Kyrgyz and Uzbeks had the same characteristics, the gap in house values would be reduced by about one third. In 2009, however, the magnitude of the coefficients effect is again much higher and close to the one estimated in our basic results.

In column (4), we run the decomposition using sampling weights, which we had ignored in our estimations so far. We described our doubts about the KIHS weights above, but we nevertheless acknowledge that it may be essential to use them, for the following reason. In comparison with the 2009 Census, in which Uzbeks made up 14 percent of the population, they are under-represented in the KIHS samples (see Table 4.1). Hence, higher weights for Uzbeks may indeed make sense, even though this does not explain the extraordinary increase in their weights before 2005. In any case, including weights leads to even more insignificant differences in mean expenditure and mean assets between Kyrgyz and Uzbeks, compared with our basic results. Only in 2005, we observe a significant welfare gap between the two ethnic groups in terms of assets. As in column (1), Uzbeks are found to have fewer assets than Kyrgyz. Yet, the decomposition now shows that this difference is mostly due to different coefficients, rather than different characteristics. This is in line with the findings in columns (2) and (3). The results for house values are qualitatively unchanged compared with our basic results.

In column (5), we add Kyrgyz and Uzbek households living in northern Kyrgyzstan to our sample. This relaxes the assumption made above, that it is differences in welfare among southern households alone that potentially drive frustration against another ethnic group. As was shown in Table 4.1, there are very few Uzbeks living in the north and, hence, we now essentially compare Kyrgyz living anywhere in the country to Uzbeks living in the south. We now find that there is no asset index gap at all, while there is a significant expenditure gap in 2005 and 2007. Uzbeks are then clearly worse off than Kyrgyz in terms of per capita expenditure and this is primarily explained by differences in the characteristics between the two groups. In terms of the house value, Uzbeks are again found to have more valuable houses, and the contribution of the coefficients effect is still larger than that of the characteristics effect, though somewhat reduced.

In column (6), we reduce the sample to those households that were interviewed in all three years. This is to rule out the possibility that changes over time, observed in Table 4.4, are driven by sample attrition. Note that the 2009 results are then identical to those in column (1), because we identify the 2009 sample households in the samples of 2005 and 2007. Expenditure again turns out to be only insignificantly different between Kyrgyz and Uzbeks, and Uzbeks are shown to have significantly higher asset indexes (at least, at a marginal level). As in our basic results, the characteristics effect makes up for 63 percent or more of the total difference in the mean asset index. This share increases over time in line with column (1), which implies that sample attrition is not driving these results. This is confirmed for the case of the house value, as the respective findings in columns (1) and (6) are very similar.

4.7. Conclusion

In this chapter, we measure welfare gaps between Kyrgyz and Uzbek households in Kyrgyzstan. We also decompose these welfare gaps in order to better understand the sources of ethnic inequality. This is motivated by the fact that there have been two major episodes of inter-ethnic violent clashes since 1990 and that economic disparities between the two groups have been used to explain the outbreak of violence. Uzbeks are reported to be more prosperous than Kyrgyz, which is in turn assumed to result in resentment among the latter. We measure welfare with the help of three alternative indicators, i.e. household expenditure, asset indexes, and house values.

With regard to household expenditure, we find that Uzbeks are not better off than Kyrgyz. They have, instead, consistently lower expenditure levels, across years, different regions of the country, and different sample sizes, though this is not always statistically significant. Decomposing the expenditure gap shows that differences in the characteristics of Kyrgyz and Uzbeks explain almost all of this gap. The Oaxaca-Blinder decomposition allows for even more disaggregated insights: It is mainly differences in household composition (i.e. more adults and elderly in the household) and ownership of livestock (i.e. less livestock) that explain the lower expenditure of Uzbeks.

Turning to the ownership of assets, we show that there is a clear difference between urban and rural areas. In towns, Kyrgyz are found to own more assets than Uzbeks (at least at a

marginal significance level), but this pattern is inverted in villages. In both cases, the welfare gap is due to differences in the coefficients between the two groups. Last but not least, the value of houses reported by Uzbeks is clearly higher than that reported by Kyrgyz, which implies that Uzbeks may have larger houses, houses of better quality, and/or houses in more expensive locations. The decomposition again emphasizes the dominance of the coefficients effect.

Disaggregation of the decomposition results for both assets and house values does not lead to clear insights which specific coefficients are at play. We get mostly insignificant results for all coefficients and, therefore, need to acknowledge the possibility that our decomposition results may be distorted. The model that we estimate does not explain the asset and house value variation as well as it explains expenditure variation. Omitting relevant characteristics (i.e. those that are partly correlated with welfare and the included explanatory variables) can erroneously lead to attributing their effect to the coefficients, as pointed out by Gunderson (1989). Even so, we believe that decomposing inter-ethnic welfare differentials is promising in studies of horizontal inequalities and hope to see further research along these lines.

So, what do we learn about horizontal inequality between Uzbeks and Kyrgyz? We are able to show that the choice of welfare measure matters a lot for studies on inequality between groups. Depending on which measure we use, we find that Uzbeks are either worse off or better off than Kyrgyz, or that there is no horizontal inequality at all. Had we relied on the most common welfare indicator used in developing countries, i.e. household expenditure, our conclusion would be that Uzbeks are certainly not better off. This would prove the display in the media completely wrong. However, looking at more visible welfare measures, such as the ownership of assets (in rural areas) and the value of the house, changes the picture. In particular, the house value clearly shows Uzbeks to be more prosperous – assuming that the reported house values are correct. We argue that inequality in such visible goods is much more worrying for the outbreak of violence than inequality in household expenditure. Even if two ethnic groups do not differ at all in terms of what they consume or what they earn, one group may feel seriously relatively deprived if the other group owns just one asset more – if this asset was easily observed. The deprived group may then assume that the other group was better off in all aspects of life. It appears that this could indeed be the case in Kyrgyzstan, where the perception of more prosperous Uzbeks may have been formed on the basis of Uzbek dominance in certain economic sectors – or, as shown here, house characteristics.

Policy-makers could challenge the public perception of one group being better-off than the other by referring to quantitative results such as ours. Making the point that Uzbeks are not clearly more prosperous than Kyrgyz, but only have more valuable (and larger) houses, could make a difference for peace-making efforts.

APPENDIX 4.1: Tables

Table 4.5: Definition of Explanatory Variables

Variables	Definition
Pre-school children	Number of children in the pre-school age (0-6 years) in the household
School children	Number of children in the school age (7-17 years) in the household
Adults	Number of working-age adults in the household
Elderly	Number of elderly people in the household, defined according to official pension age, which changed over time
Age of head	Age of a household head
Female head	Dummy variable, taking the value 1 if household head is female, 0 otherwise
Schooling years	Average number of years of education of all household members older than 18 years
Hours in services	Hours of work per week in the services sector (comprising of trade, transport and communication, real estate, hotels and dining, financial services) by a representative employed household member
Irrigated land size	Area of irrigated and cultivated land in hectares
Sheep equivalent units	Sheep equivalent units (one cattle is equal to five sheep)
Rural	Dummy variable, taking the value 1 if household resides in a rural area, 0 otherwise
Djalalabad	Dummy variable, taking the value 1 if household resides in Djalalabad oblast, 0 otherwise
Batken	Dummy variable, taking the value 1 if household resides in Batken oblast, 0 otherwise
Osh	Dummy variable, taking the value 1 if household resides in Osh oblast, 0 otherwise

Table 4.6: Household Characteristics

South sample only

	2005			***2007***			***2009***		
	All	***Kyrgyz***	***Uzbek***	***All***	***Kyrgyz***	***Uzbek***	***All***	***Kyrgyz***	***Uzbek***
Pre-school children	0.56	0.60	0.56	0.50	0.53	0.54	0.43	0.46	0.46
School children	1.40	1.48	1.48	1.35	1.43	1.31	1.27	1.37	1.19*
Adults	2.23	2.23	2.51*	2.20	2.19	2.50*	2.30	2.31	2.49
Elderly	0.34	0.28	0.38*	0.32	0.26	0.40*	0.36	0.30	0.44*
Age of head	48.89	47.14	50.67*	50.13	48.62	52.55*	52.19	51.05	53.66*
Female head	0.32	0.29	0.32	0.35	0.33	0.34	0.35	0.33	0.35
Schooling years	10.82	11.04	10.02*	10.81	11.02	10.06*	10.70	10.88	10.10*
Hours/week worked in services	12.42	11.36	17.38*	12.81	11.53	18.74	13.19	11.55	18.81*
Irrigated land size	3.06	3.97	1.43*	4.14	5.35	1.68*	3.96	5.22	1.55*
Sheep equivalent units	7.33	9.56	3.03*	8.29	10.91	2.87*	8.39	11.31	2.60*
Rural	0.41	0.51	0.27*	0.49	0.58	0.33*	0.52	0.62	0.35*
Djalalabad	0.37	0.38	0.37	0.37	0.37	0.38	0.35	0.35	0.36
Batken	0.28	0.30	0.16*	0.28	0.30	0.15*	0.29	0.33	0.16*
Osh	0.35	0.32	0.48	0.35	0.32	0.46	0.36	0.32	0.49
Observations	1,732	1,167	383	1,292	889	289	1,067	717	257

Source: Authors' calculation based on KIHS data.

Note: Cell entries are survey means. No sampling weights are taken into account. * indicates that the difference in the means between Kyrgyz and Uzbeks is statistically significant at the 5% level.

Table 4.7: Sensitivity checks: Oaxaca-Blinder decomposition

	(1) Basic	*(2) Urban only*	*(3) Rural only*	*(4) With weights*	*(5) Incl. North*	*(6) 2009 sub-sample*
			Per capita expenditure (log)			
			2005			
Difference in mean	0.0529	0.1344***	0.0074	0.0445	0.0736**	0.0170
Characteristics effect (share)	86.76	75.75***	1502.82***	187.99	123.93***	109.20
Coefficients effect (share)	13.24	24.25	-1402.82**	-87.99	-23.93	-9.20
			2007			
Difference in mean	0.0855***	0.1192**	0.1058**	0.0450	0.1145***	0.0634*
Characteristics effect (share)	80.94**	50.14	141.05***	275.06**	99.06***	71.20
Coefficients effect (share)	19.06	49.86	-41.05	-175.06*	0.94	28.80
			2009			
Difference in mean	0.0200	0.0974**	0.0162	-0.0313	-0.0257	0.0200
Characteristics effect (share)	139.64	77.05**	488.43*	-255.21	-4.59	139.64
Coefficients effect (share)	-39.64	22.95	-388.43	355.21*	104.59	-39.64
			Asset index (log)			
			2005			
Difference in mean	-0.0967**	0.0636	-0.1577***	-0.1456**	-0.0424	-0.1215***
Characteristics effect (share)	51.40	39.42	-5.12	6.56	-74.41	63.21*
Coefficients effect (share)	48.60	60.58	105.12***	93.44***	174.41**	36.79
			2007			
Difference in mean	-0.0626	0.1033**	-0.1045**	-0.0705	-0.0038	-0.0800*
Characteristics effect (share)	83.87	18.00	2.36	-4.67	-997.23	90.10*
Coefficients effect (share)	16.13	82.00**	97.64*	104.67	1097.23	9.90
			2009			
Difference in mean	-0.0899**	0.1116**	-0.1242**	-0.0635	-0.0206	-0.0899**
Characteristics effect (share)	86.43*	10.17	9.29	65.66	-124.02	86.43*
Coefficients effect (share)	13.57	89.83**	90.71*	34.34	224.02	13.57

Source: Authors' calculation based on KIHS data.
Note: *** - difference in the means is significant at 1% level, ** - at 5% level, * - at 10% level.

Table 4.7: Sensitivity checks: Oaxaca-Blinder decomposition (ctd.)

	(1) Basic	*(2) Urban only*	*(3) Rural only*	*(4) With weights*	*(5) Incl. North*	*(6) 2009 sub-sample*
			House value (log)			
			2005			
Difference in mean	-0.4934***	-0.6265***	-0.1577***	-0.4638***	-0.5578***	-0.5647***
Characteristics effect (share)	14.33	37.07	-5.12	-11.18	31.89	2.57
Coefficients effect (share)	85.67***	62.93**	105.12***	111.18***	68.11***	97.43***
			2007			
Difference in mean	-0.4580***	-0.5161***	-0.3570*	-0.5791***	-0.5055***	-0.4932***
Characteristics effect (share)	3.60	26.32	-25.67	4.42	27.86	3.32
Coefficients effect (share)	96.40***	73.68***	125.67***	95.58***	72.14***	96.68***
			2009			
Difference in mean	-0.4461***	-0.3395***	-0.5386***	-0.6060***	-0.4871***	-0.4461***
Characteristics effect (share)	-5.96	-19.41	-14.63	2.09	29.30**	-5.96
Coefficients effect (share)	105.96***	119.41***	114.63***	97.91***	70.70***	105.96***

Source: Authors' calculation based on KIHS data.
Note: *** - difference in the means is significant at 1% level, ** - at 5% level, * - at 10% level.

Table 4.8: Dwelling characteristics of Kyrgyz and Uzbeks, 2005

South sample only

	Rural and urban		***Rural***		***Urban***	
	Kyrgyz	***Uzbek***	***Kyrgyz***	***Uzbek***	***Kyrgyz***	***Uzbek***
Area of dwelling (m^2)	82.01	85.31	98.20	97.62	65.29	80.72*
Living area of dwelling (m^2)	58.97	62.11	72.07	75.29	45.43	57.19*
Number of rooms	3.37	3.77*	3.87	4.06	2.85	3.66*
Per capita area of dwelling (m^2)	20.47	20.46	22.40	22.78	18.48	19.59

Note: Cell entries are survey means. No sampling weights are taken into account. * indicates that the mean of the Uzbek group is different from the mean of the Kyrgyz group at a significance level of 5 percent.
Source: Authors' calculation based on KIHS data.

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