

# Determinants and Welfare Effects of Smallholder Export Participation in Kyrgyzstan

Damir Esenaliev\* and Isabel Teichmann\*\*

\* SIPRI Stockholm, esenaliev@sipri.org; \*\* DIW Berlin, iteichmann@diw.de



WIUT Research Seminar  
Tashkent, Uzbekistan, 15 November 2018

# Motivation

- Small-scale farmers produce most of the food consumed in dev'ing countries, but tend to be among the food-insecure and poor
- Improved smallholder market access to fight global hunger and poverty (e.g., United Nations 2015: Social Development Goal 2.3)
- Challenges and opportunities differ between domestic and export markets
  - Hindrances common to both markets (e.g., Goetz 1992; Key et al. 2000)
    - Lack of communication and transportation infrastructure
    - Lack of insurance against risks
    - Lack of farmers' productive assets
    - Low productivity
  - Access to export markets challenged by rising food quality requirements (e.g., OECD 2007, 2006)
  - Exports provide better prospects from selling to higher-income countries

We use the "Life in Kyrgyzstan" (LiK) 2010-2013 panel household survey to answer the following questions:

- 1 What are the determinants of smallholder export participation vs. domestic market participation?
- 2 What is the impact of smallholder export participation on household welfare (agricultural income, total income, food consumption, total expenditures)?
- 3 How do quality requirements impact smallholder export participation and welfare?

## **Determinants of smallholder market participation vs. non-participation**

- Sector studies (e.g., Goetz 1992; Key et al. 2000; Boughton et al. 2007)
- Total agricultural sales (e.g., Heltberg and Tarp 2002)

⇒ No differentiation between domestic-market and export-market participation

## **Smallholder choice of domestic marketing channel and its impacts**

- Sector studies (e.g., Neven et al. 2009; Rao and Qaim 2011; Fischer and Qaim 2012)

⇒ No differentiation between domestic-market and export-market participation

## **Effects of smallholder export participation on household income**

- Sector studies (e.g., McCulloch and Ota 2002; Maertens and Swinnen 2009)

⇒ Export participation increases household income

# Why Did We Choose Kyrgyzstan as a Case Study?

## **Agriculture is an important sector for the Kyrgyz economy**

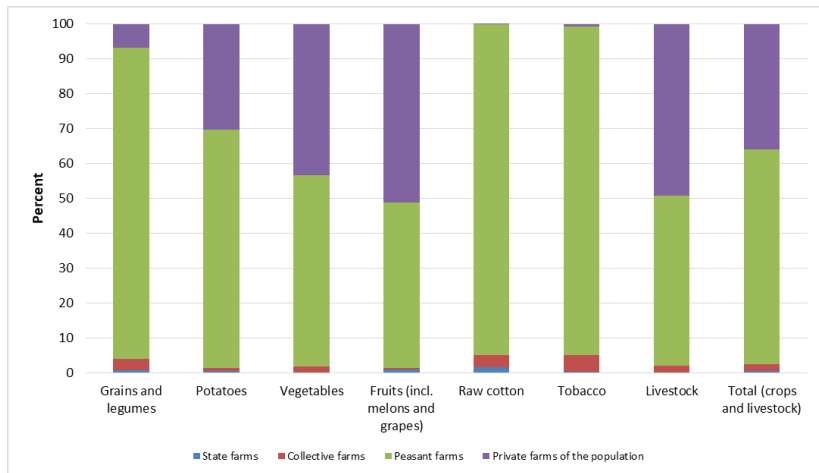
- Share of agriculture in GDP: 19% (2010-2012)
- Agricultural employment: 30% (2012)
- Rural population: 65% (2010-2013)

## **Dominance of small-scale farms**

- Land privatization and urban-to-rural migration in 1990s (e.g., Akramov and Omuraliev 2009; Lerman and Sedik 2009)
- More than 95% of agricultural production by peasant farms and private farms of the population (NSC 2018)
  - Peasant farms: 2.8 ha (family-owned land)
  - Private farms: 0.1 ha (household orchards/kitchen gardens)

# Why Did We Choose Kyrgyzstan as a Case Study?

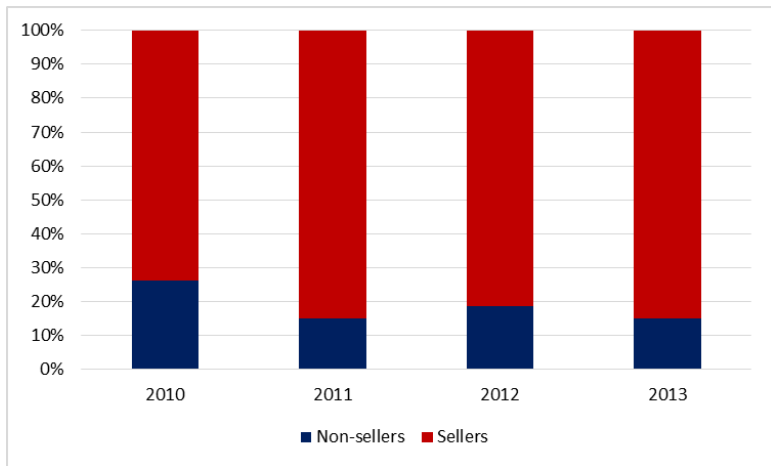
## Production of selected agricultural goods in Kyrgyzstan by farm type, 2010



Source: Own calculation based on NSC (2018)

# Why Did We Choose Kyrgyzstan as a Case Study?

**Most of the small-scale farmers are integrated into food markets**



Sources: LiK (2010, 2011, 2012, 2013)

# Why Did We Choose Kyrgyzstan as a Case Study?

## **Kyrgyzstan is a market- and trade-oriented country**

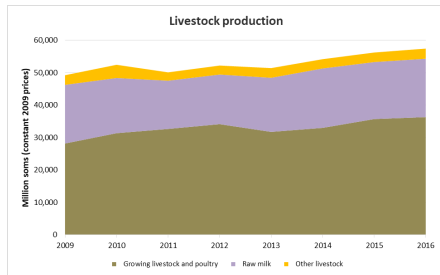
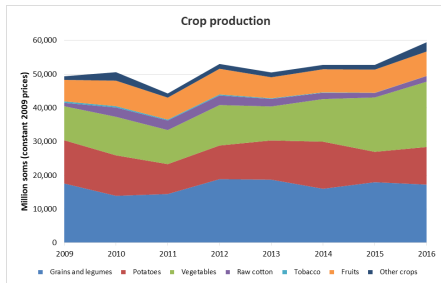
- Unregulated agricultural sector  $\Rightarrow$  Farmers' decisions mainly market-driven
- Liberal trade regime and pro-export stance of government
  - Far-reaching unilateral trade liberalization soon after 1991
  - 1996: Member of Eurasian Economic Community
  - 1998: WTO accession
  - 2014: Member of CIS FTA
  - 2015: Member of Eurasian Economic Union



# Why Did We Choose Kyrgyzstan as a Case Study?

## Diverse agricultural products

- Crop and livestock production account for nearly equal shares
- Main products: Grains/legumes, potatoes, vegetables, fruits, livestock, milk



Source: NSC (2018)

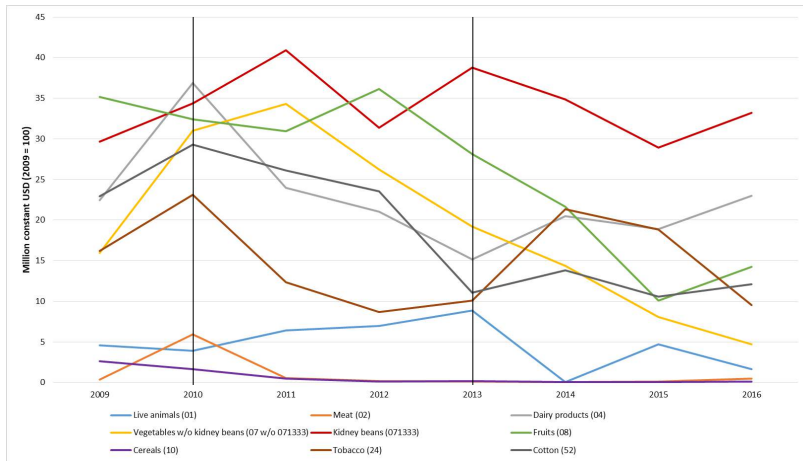
# Why Did We Choose Kyrgyzstan as a Case Study?

## **Diverse agricultural exports**

- 7% of total output of agriculture and the food industry exported in 2012 (Mogilevskii and Akramov 2014)
- Official exports of agricultural products, 2009-2014: 15% of total merchandise exports (Tilekeyev et al. 2018)
- Main export destinations: Kazakhstan, Turkey, Russia, EU, and China
- Main export products: Kidney beans, other vegetables, fruits, dairy products, cotton, and tobacco

# Why Did We Choose Kyrgyzstan as a Case Study?

## Kyrgyzstan's real exports of selected agricultural products, 2009-2016



Sources: UN COMTRADE (2018); Tilekeyev et al. (2018); State Customs Service (2014)

# Why Did We Choose Kyrgyzstan as a Case Study?

## **However, natural and administrative impediments to trade exist ...**

- Long distances to world markets and many borders during land transport
- Inadequate transport networks in Kyrgyzstan and Central-Asian neighbors
- Customs-clearance issues and uncertainties at border crossings

## **... and Kyrgyzstan faces rising quality standards in its major agricultural export destinations of the EU, Russia, and Kazakhstan**

- Mainly driven by supermarkets (World Bank 2011)
- Stricter veterinary and SPS rules after creation of Russia-Kazakhstan-Belarus customs union in 2010 (Mogilevskii and Akramov 2014)
  - Russian and Kazakh import ban on Kyrgyz livestock and meat products
  - 2011-2012: Kazakh import ban on Kyrgyz potatoes (potato beetle)
  - 2012-2013: Kazakh import ban on Kyrgyz dairy products (food safety)

# "Life in Kyrgyzstan" (LiK) Survey

## General

- Panel household survey conducted annually over 2010-2013 (Brück et al. 2014) - and again in 2016
- 2010: 3,000 households, 8,160 individuals, 120 communities
- All 2010 household members tracked for each wave; new household members added and tracked as well
- Representative at national, rural/urban, north/south levels

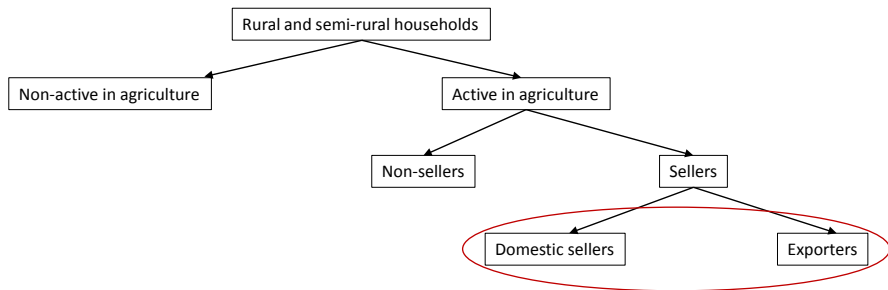
## Agricultural module

- General sales activity, export participation, fulfillment of quality requirements
- Quality requirements: Fertilizer, pesticides/chemicals, inputs, storage, transport, harvesting, hygiene, equipment, animal welfare

# Household Sample

## Sample selection

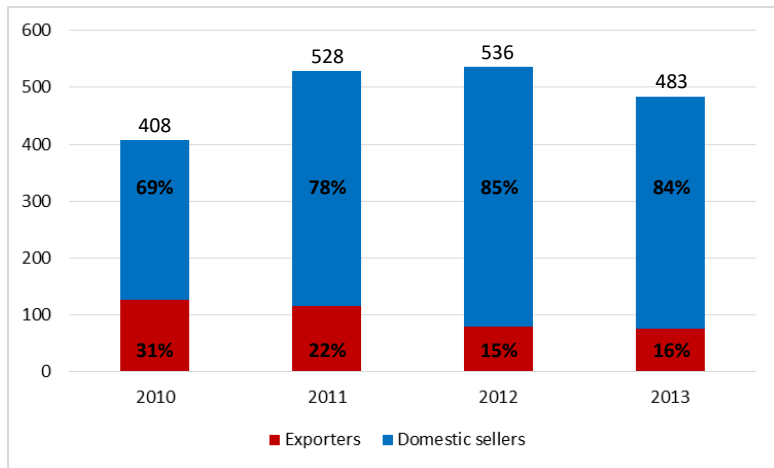
- Rural and semi-rural households
- Active in agriculture as smallholders
- Sell their products either domestically or in export markets
- Seller status for at least three years



## Two groups of selling households

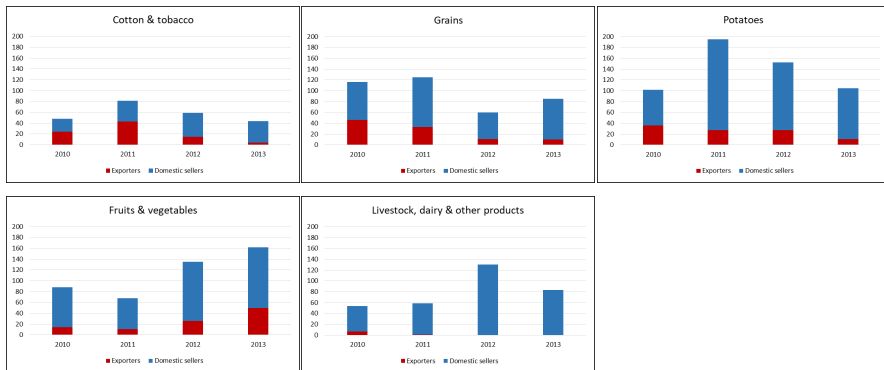
- Export participants: Main share of main market product is exported
  - Direct exports or via exporter/intermediary
  - 2011-2013: Export share of household's main market product is in most of the cases 100%
- Domestic sellers: Main share of main market product is sold domestically

## Total number of export participants and domestic sellers





## Number of export participants and domestic sellers by product category



## Descriptive statistics

	Total	Domestic sellers	Exporters	Difference
<b>Household welfare (soms)</b>				
Monthly agricultural income p. c.	3,542.14	3,329.61	4,378.86	-1,049.25***
Total monthly household income p. c.	6,403.68	6,233.49	7,073.69	-840.20**
Monthly food consumption p. c.	2,748.07	2,803.93	2,528.18	275.75***
Total monthly household expenditures p. c.	5,715.47	5,770.55	5,498.64	271.91
<b>Quality requirements fulfilled</b>				
At least one quality requirement fulfilled	0.52	0.48	0.66	-0.18***
# of quality requirements fulfilled	1.85	1.82	1.94	-0.12

\* p<.1; \*\* p<.05; \*\*\* p<.01

## Hypotheses

- Households that fulfill quality requirements have a higher export propensity
- Export participation additionally influenced by household demographics, household productive assets, risk-related factors (e.g., Goetz 1992; Key et al. 2000; Heltberg and Tarp 2002; Boughton et al. 2007; Maertens and Swinnen 2009)

## Estimation strategy

- Fixed-effects (FE) logit model
- Population-averaged (PA) logit model
- Random-effects (RE) logit model

# Determinants of Smallholder Export Participation

## Fixed-effects (FE) logit model

$$Pr(\text{export}_{it} = 1 | \mathbf{z}_{it}, \gamma_t, \alpha_i) = \Lambda(\mathbf{z}'_{it}\beta + \gamma_t + \alpha_i)$$

- $\text{export}_{it}$ : Dummy variable for export of household's main market product
- $\mathbf{z}_{it}$ : Vector of explanatory variables
  - Household demographics, number of workers outside agriculture
  - Products
  - Number of quality requirements fulfilled
  - Livestock, owned land, irrigation share, equipment
  - Shocks, household head's risk-taking attitude, social network
- $\gamma_t, \alpha_i$ : Year dummies, household-specific effects

## Population-averaged (PA) and random-effects (RE) logit models

- $\mathbf{z}_{it}$  further include ethnicity, region dummies, distance variables

# Determinants of Smallholder Export Participation

	FE logit estimator	PA logit estimator		RE logit estimator	
		(1)	(2)	(1)	(2)
Household size	-0.0257	-0.0248	0.0402	-0.1854	0.0177
# of children	0.0064	-0.0127	-0.0625	0.0648	-0.0549
# of old-age members	2.2249***	0.2357	-0.0068	0.7415	0.1654
# of migrants abroad	0.3491	-0.1768**	-0.1337	-0.3022	-0.1625
Age of household head	8.4127	0.0211	0.0580	0.1291	0.0904
Age squared of household head	0.0075	-0.0003	-0.0005	-0.0014	-0.0008
Female household head	16.2455	-0.2507	-0.0513	-0.5240	-0.1124
Uzbek ethnicity			0.8046***		1.1563***
Other ethnicity			0.0910		0.3864
# of workers in industry	0.4976	-0.1439	-0.0785	-0.4760	-0.2060
# of workers in services	-0.0047	0.0075	-0.1942	-0.2068	-0.2326
Cotton & tobacco	5.6394***	2.7568***	4.7030***	5.8221***	5.1443***
Grains	2.7365***	1.4836***	2.2509***	3.5262***	2.3835***
Potatoes	2.0712***	1.2366***	1.5665***	2.9855***	1.6776***
Fruits & vegetables	4.7394***	1.8459***	2.7821***	4.2837***	3.0599***
# of quality requirements fulfilled	0.1302*	0.1047***	0.2705***	0.1843***	0.2835***
Livestock (sheep-equivalent units)	-0.0122*	0.0002	-0.0109***	-0.0041	-0.0128***
Total owned land (ha)	0.5607**	0.0244	-0.0088	0.0512	-0.0117
Irrigated share of owned agric. land	1.7366**	1.2165***	0.7289	2.6698***	0.7214
Equipment	-0.3683	-0.3242	-0.6719*	-0.2950	-0.6632*
N	527	1933	1932	1933	1932

# Determinants of Smallholder Export Participation

	FE logit estimator	PA logit estimator		RE logit estimator	
		(1)	(2)	(1)	(2)
Shocks (agriculture)	0.4535	0.0682	-0.1766	0.0420	-0.0539
Shocks (family)	0.0024	-0.0266	-0.4129	-0.3570	-0.4196
Shocks (sales)	1.2129***	0.4308***	0.8547***	0.8022***	0.8565***
Risk-taking attitude of household head	0.1493**	0.0729***	-0.0088	0.1430***	-0.0041
Household head has strong social ntwk	-0.4101	-0.1050	0.2605	-0.4274*	0.2450
Chui			0.4614		0.1699
Talas			4.8795***		5.2916***
Batken			-2.0458***		-2.1640***
Jalalabad			-1.5029***		-1.8379***
Osh			-1.4401***		-1.8166***
Distance to main road (km)			0.2442		0.2716**
Squared distance to main road			-0.0232*		-0.0264***
Distance to next market (km)			-0.0647		-0.0650*
Squared distance to next market			0.0016		0.0017
Year 2010	29.7805	0.8709***	2.0691***	1.9454***	2.2005***
Year 2011	18.8753	0.3383***	0.8559***	0.6249**	0.8608***
Year 2012	8.5733	-0.0699	0.1182	-0.2233	0.0059
Constant		-5.1492***	-7.8800***	-12.7883***	-9.0667***
N	527	1933	1932	1933	1932

## Hypothesis

- Smallholder households benefit from export participation
  - Results from literature review (and descriptive statistics)
  - Exports to countries with higher per-capita incomes than Kyrgyzstan
  - But: Higher transport costs, transaction costs

## Econometric challenge

- Potential endogeneity of  $export_{it}$  due to self-selection

## Estimation strategy

- Fixed-effects (within) estimator

## Fixed-effects estimator

$$y_{it} = \beta_0 + \text{export}_{it}\tau_1 + \text{both}_{it}\tau_2 + \text{stop}_{it}\tau_3 + \mathbf{x}'_{it}\boldsymbol{\beta} + \gamma_t + \alpha_i + \epsilon_{it}$$

- $y_{it}$ : Household welfare
  - $\ln(\text{monthly agricultural income p.c.})$
  - $\ln(\text{total monthly household income p.c.})$
  - $\ln(\text{monthly food consumption p.c.})$
  - $\ln(\text{total monthly household expenditures p.c.})$
- $\text{export}_{it}$ : Dummy variable for export of household's main market product
- $\text{both}_{it}$ : Dummy variable if household also exported in previous period
- $\text{stop}_{it}$ : Dummy variable if household stopped to export in current period



## Fixed-effects estimator

$$y_{it} = \beta_0 + \text{export}_{it}\tau_1 + \text{both}_{it}\tau_2 + \text{stop}_{it}\tau_3 + \mathbf{x}'_{it}\boldsymbol{\beta} + \gamma_t + \alpha_i + \epsilon_{it}$$

- $\mathbf{x}_{it}$ : Vector of explanatory variables
  - Products
  - Household demographics, number of workers outside agriculture
  - Number of quality requirements fulfilled
  - Livestock, owned land, irrigation share, equipment
  - Shocks, household head's risk-taking attitude

# Welfare Impact of Smallholder Export Participation

## Overview of impact on outcome variables

- Current exporters have significantly higher agricultural income
- Increase in all outcome variables if export status also in previous year

	<i>export<sub>it</sub></i>	<i>both<sub>it</sub></i>	<i>stop<sub>it</sub></i>
<b>Agricultural income</b>	0.2168**	0.2307***	-0.0009
<b>Total income</b>	0.0888	0.1318**	-0.0942
<b>Food consumption</b>	-0.0164	0.0969**	0.0383
<b>Total expenditures</b>	0.0021	0.0864**	0.0589
<b>N</b>		1616	

Dependent variable: Monthly basis, p.c., natural logarithm; \* p<.1; \*\* p<.05; \*\*\* p<.01

# Welfare Impact of Smallholder Export Participation

	Agricultural income	Total income	Food consumption	Total expenditures
Exporter	0.2168 **	0.0888	-0.0164	0.0021
Exported also in previous year	0.2307 ***	0.1318**	0.0969 **	0.0864 **
Stopped exporting	-0.0009	-0.0942	0.0383	0.0589
Cotton & tobacco	0.3803 ***	0.1757	0.1321**	0.1606 **
Grains	0.1792	0.1086	0.0375	0.0434
Potatoes	0.1853 *	0.0547	-0.0196	-0.0106
Fruits & vegetables	0.3251 ***	0.1868**	0.0824 *	0.1341 ***
Household size	-0.1355 ***	-0.1440***	-0.0448**	-0.0316
# of children	-0.0112	0.0393	0.0004	-0.0279
# of old-age members	0.2313	0.2271**	0.2240***	0.1411
# of migrants abroad	-0.0460	-0.0265	0.0797***	0.0704 **
Age of household head	-0.0378	-0.0080	0.0142	-0.0011
Age squared of household head	0.0002	0.0000	-0.0001	0.0000
Female household head	-0.1642	-0.0401	0.1433	0.2039
Average education of household members	-0.0160	-0.0197	0.0064	-0.0107
# of workers in industry	-0.1107	0.1997***	-0.0441	-0.0687 *
# of workers in services	-0.0664	0.2262***	-0.0166	0.0106
# of quality requirements fulfilled	0.0429 ***	0.0288***	0.0139**	0.0088
Livestock (sheep-equivalent units)	0.0053 ***	0.0037**	0.0032**	0.0027 *
Total owned land (ha)	0.0193	0.0142	-0.0120	-0.0096
Irrigated share of owned agric. land	-0.1891	-0.0844	-0.0235	0.0067
Equipment	-0.0757	-0.0158	0.0843	0.1831 ***
Shocks (agriculture)	-0.0340	-0.0254	0.0586**	0.0400
Shocks (family)	0.1057	0.1542**	0.0467	0.1003 ***
Shocks (sales)	0.0364	-0.0205	-0.0061	-0.0027
Risk-taking attitude of household head	-0.0213 **	-0.0174**	0.0085 *	0.0159 ***
Year 2010	-0.5333 ***	-0.6495***	-0.0109	-0.3532 ***
Year 2011	-0.4627 ***	-0.3809***	0.0095	-0.3150***
Year 2012	-0.3231 ***	-0.2776***	-0.0974**	-0.1785 ***
Constant	10.1162 ***	9.7645***	7.4349***	8.9322 ***
N	1616	1616	1616	1616

## Findings

- Adherence to quality requirements has significantly positive effects on smallholder export participation and welfare
- Significantly positive effects of continued export participation on all outcome variables
- ⇒ Support smallholder export activity
- ⇒ Support quality-related technology upgrading

Thank you very much for your attention!



<https://lifeinkyrgyzstan.org/>