

# Determinants and Welfare Effects of Smallholder Export Participation in Kyrgyzstan

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# Motivation

- Emphasis on smallholder agriculture for global food security and poverty alleviation (e.g., IFPRI 2011; WDR 2008)
- Unresolved debate on trade and poverty, lack of household-level analysis (Winters et al. 2004)
- Role of increasing quality requirements (e.g., OECD 2007, 2006)

Use "Life in Kyrgyzstan" (LiK) panel survey to answer the following questions:

- 1 Determinants of smallholder export participation vs. domestic-market participation?
- 2 Impact of smallholder export participation on household welfare (agricultural income, total income, consumption, expenditures)?
- 3 Impact of quality requirements on smallholder export participation and welfare?

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

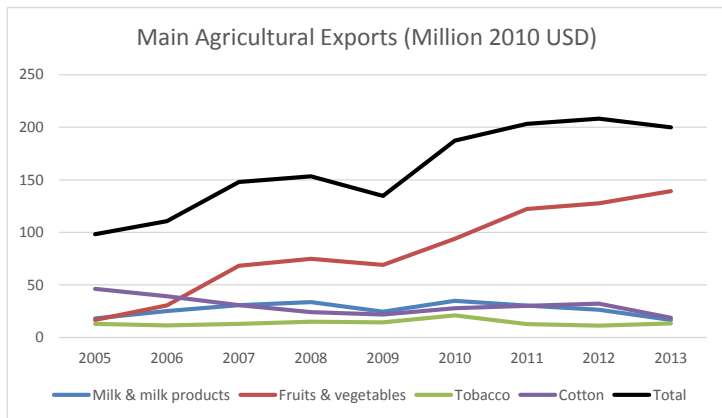
- Share of agriculture in GDP: 19% (2010-2012)
- Agricultural employment: 30% (2012)
- Rural population: 65% (2010-2013)

## **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 90% of agricultural production by peasant farms and household plots (NSC 2011)
  - Peasant farms: 2.8 ha (family-owned land)
  - Household plots: 0.1 ha (household orchards/kitchen gardens)

# Trade in Agriculture

- Main products: Grains, potatoes, vegetables, fruits, livestock, milk
- Main export products: Vegetables, fruits, milk, cotton, tobacco
- Main export destinations: Kazakhstan, Russia, Turkey, China, EU



## **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
  - 2015: Member of Eurasian Economic Union

## **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
- High tariffs on agricultural products in Central Asia and China

## **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., 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; Maertens et al. 2011)

⇒ Export participation increases household income

# "Life in Kyrgyzstan" (LiK) Survey

## General

- Panel household survey conducted annually over 2010-2013 (Brück et al. 2014)
- Stratified two-stage random sampling based on 2009 Population Census
- 2010: 3,000 households, 8,160 individuals, 120 communities
- Representative at national, rural/urban, north/south levels

## Agricultural module

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

## 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

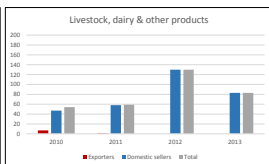
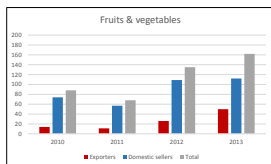
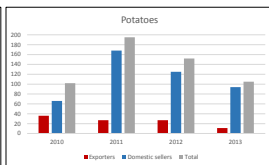
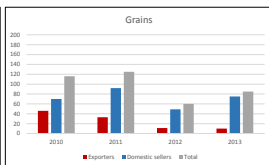
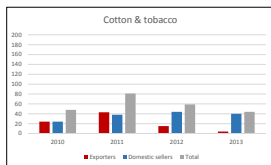
- Export participants: *Main* share of household's *main* market product is exported (directly or via exporter/intermediary)
- Domestic sellers: *Main* share of household's *main* market product is sold domestically



## Number of export participants and domestic sellers, in total ...

	2010		2011		2012		2013	
Exporters	127	31%	115	22%	79	15%	75	16%
Domestic sellers	281	69%	413	78%	457	85%	408	84%
<b>Total</b>	<b>408</b>		<b>528</b>		<b>536</b>		<b>483</b>	

## ... and by product category



# Determinants of Smallholder Export Participation

## Fixed-effects (FE) logit model

$$export_{it} = \mathbf{z}'_{it}\beta + \gamma_t + \alpha_i + \epsilon_{it}$$

- $export_{it}$ : 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 and social network

## 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
# 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	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*
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 network	-0.4101	-0.1050	0.2605	-0.4274*	0.2450
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
  - Exports to countries with higher per-capita incomes than Kyrgyzstan
  - But: Higher transport costs, transaction costs

## Estimation strategy

- Fixed-effects (within) estimator
- Propensity-score (PS) weighting (Hirano and Imbens 2001)
  - Re-weighting based on sampling weights derived from propensity scores
- PS matching (Rosenbaum and Rubin 1983)
  - Pair exporting and non-exporting households based on similarities in propensity scores
  - Single-nearest-neighbor matching without replacement

## Fixed-effects estimator

$$y_{it} = \beta_0 + export_{it}\tau + \mathbf{x}'_{it}\boldsymbol{\beta} + \gamma_t + \alpha_i + \epsilon_{it}$$

- $y_{it}$ : Household welfare
  - $\ln(\text{monthly agricultural income})$
  - $\ln(\text{total monthly household income})$
  - $\ln(\text{total monthly household consumption})$
  - $\ln(\text{total monthly household expenditures})$
- $export_{it}$ : Dummy variable for export of household's main market product
- $\mathbf{x}_{it}$ : Vector of explanatory variables
  - Products
  - Household demographics, number of workers outside agriculture
  - Adherence to quality requirements
  - Livestock, owned land, irrigation share
  - Shocks and household head's risk-taking attitude

# Welfare Impact of Smallholder Export Participation

## Overview of impact on outcome variables

- Exporters have significantly higher agricultural income and total household income
- Exporters do not significantly differ in their monthly household consumption and expenditures

	FE estimator	PS weighting	PS matching
<b>Agricultural income</b>	0.2144 *** 0.0678	0.3681 *** 0.1054	0.2358 *** 0.0703
<b>Total household income</b>	0.1253 ** 0.0529	0.1850 ** 0.0818	0.1215 ** 0.0556
<b>Consumption</b>	0.0000 0.0286	-0.0249 0.0298	0.0096 0.0302
<b>Expenditures</b>	0.0015 0.0291	-0.0152 0.0289	0.0126 0.0307
<b>N</b>	1954	1954	1330

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

# Welfare Impact of Smallholder Export Participation

$y_{it}$ : ln(total monthly HH income)	FE estimator	PS weighting	PS matching
Exporter	0.1253 **	0.1850 **	0.1215 **
Cotton & tobacco	0.1656 *	0.1329	0.0465
Grains	0.1029	0.0515	-0.0806
Potatoes	0.0434	0.0173	-0.1130
Fruits & vegetables	0.1957 ***	0.1905 **	0.0931
Household size	0.0569 *	0.0584 *	0.0588
# of children	-0.0643	-0.0880 *	-0.0519
# of old-age members	0.2437 **	0.2284 **	0.2470 **
# of migrants abroad	0.0541	0.0497	0.0273
Age of household head	-0.0021	0.0046	-0.0414
Age squared of household head	0.0000	0.0000	0.0003
Female household head	0.0427	-0.0553	0.2369
# of workers in industry	0.2366 ***	0.2565 ***	0.2792 ***
# of workers in services	0.2087 ***	0.2302 ***	0.2210 ***
Quality requirements	0.0415	0.0179	0.0090
Livestock (sheep-equivalent units)	0.0038 ***	0.0035 ***	0.0043 **
Total owned land (ha)	-0.0025	-0.0009	-0.0166
Irrigated share of owned agric. land	-0.0461	-0.1084	0.0927
Shocks (agriculture)	-0.0649 *	-0.0623 *	-0.0672 *
Shocks (family)	0.1019 *	0.0810	0.1160 *
Shocks (sales)	-0.0496	-0.0431	-0.0716
Risk-taking attitude of household head	-0.0115	-0.0184 *	-0.0108
Year 2010	-0.6414 ***	-0.6501 ***	-0.6784 ***
Year 2011	-0.3501 ***	-0.3910 ***	-0.3538 ***
Year 2012	-0.2507 ***	-0.2688 ***	-0.2701 ***
Constant	9.4107 ***	9.4111 ***	10.5397 ***
N	1954	1954	1330

## Preliminary findings

- Quality requirements have significantly positive effect on smallholder export participation
- Significantly positive effects of export participation on agricultural and total household income, but not on consumption and expenditures
- ⇒ Support smallholder export activity

## Further steps

- Alternative outcome variables (e.g., asset index)
- Improve estimation strategy
- Better exploit fluctuation in export status (cf. Bernard and Jensen 1999)
- Poverty simulation



**Thank you for your attention!**