MEASURING IMPACTS AND FINANCING INFRASTRUCTURE IN THE KYRGYZ REPUBLIC

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INTRODUCTION

- Transportation costs as the transaction costs in economic exchange process plays important role in the economic performance (Arvis, Marteau and Raballand, 2010)

- Central Asian economies as the land-locked countries heavily dependent on border-crossing (Raballand, 2003)

- The transport infrastructure of Kyrgyzstan is not well-developed

- Recent substantial effort by the Government road construction

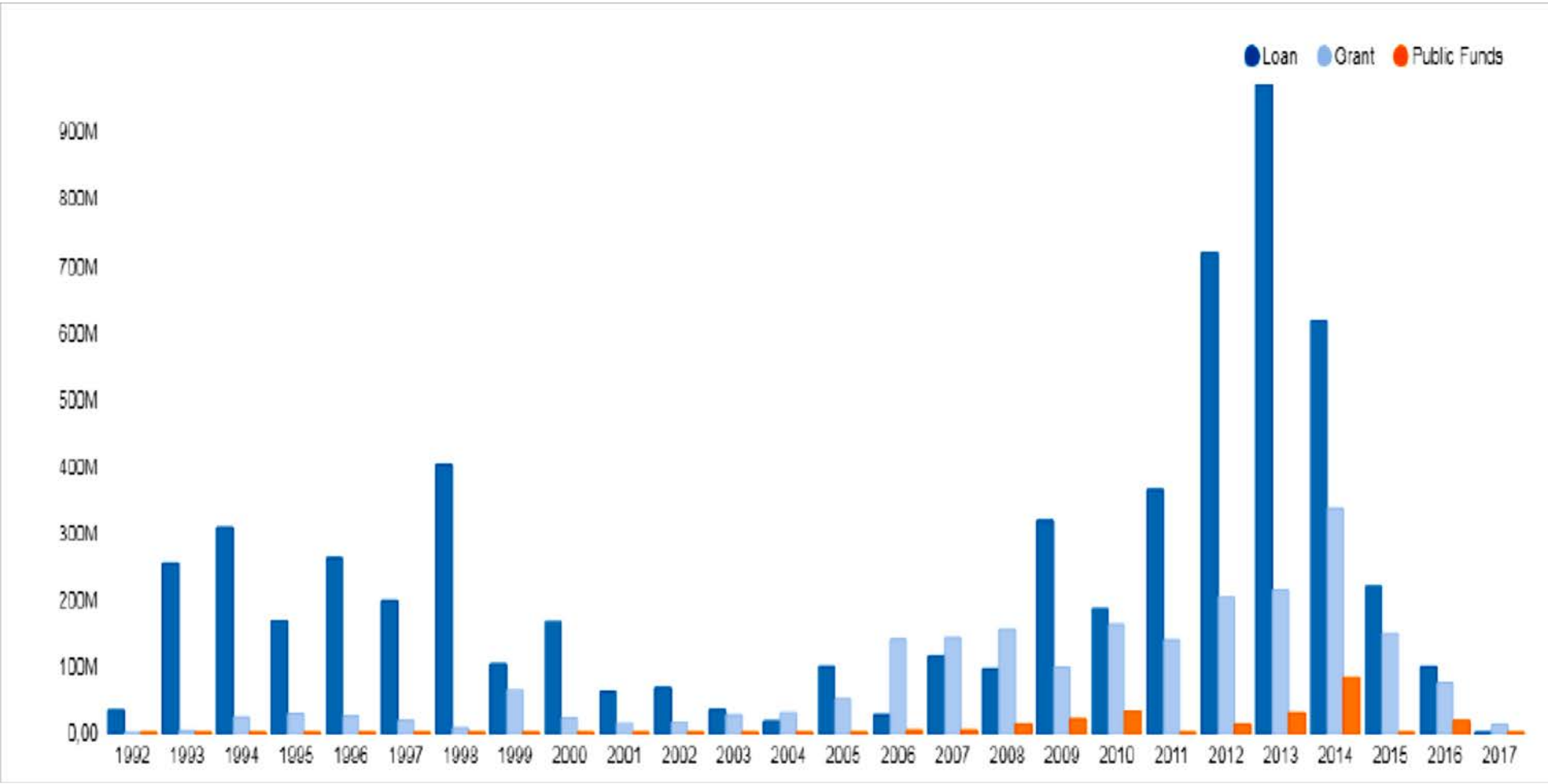
- This paper aims
  - To provide with empirical evidence on the impact of road construction project in Kyrgyzstan
  - Discuss financing infrastructure in Kyrgyzstan context

MACROECONOMIC INDICATORS (2001-2016)

	2001-2005	2006-2010	2011-2015	2016
GDP per capita (PPP, US $)	2270.1	2687.0	3066.0	3293.7
GDP growth	3.8	4.5	4.9	3.8
Sectorial share in GDP (%)				
– Services	40.3	50.0	54.1	55.9
– Industry	24.2	23.7	28.3	29.2
– Agriculture	35.5	26.3	17.6	14.9
Inflation rate (CPI, %)	4.1	11.0	8.0	0.4
Public External Debt (% of GDP)*	89.7	54.7	50.9	56.6
FDI, net inflows (% of GDP)	2.5	6.6	9.0	9.5
Trade (% of GDP)	85.9	134.1	129.2	108.7
– Imports of goods and services	46.7	83.2	86.4	71.9
– Exports of goods and services	39.2	50.9	42.8	36.8
Remittances, received (% of GDP)	5.3	21.3	28.9	30.4
Unemployment rate	9.4	8.3	8.2	7.2

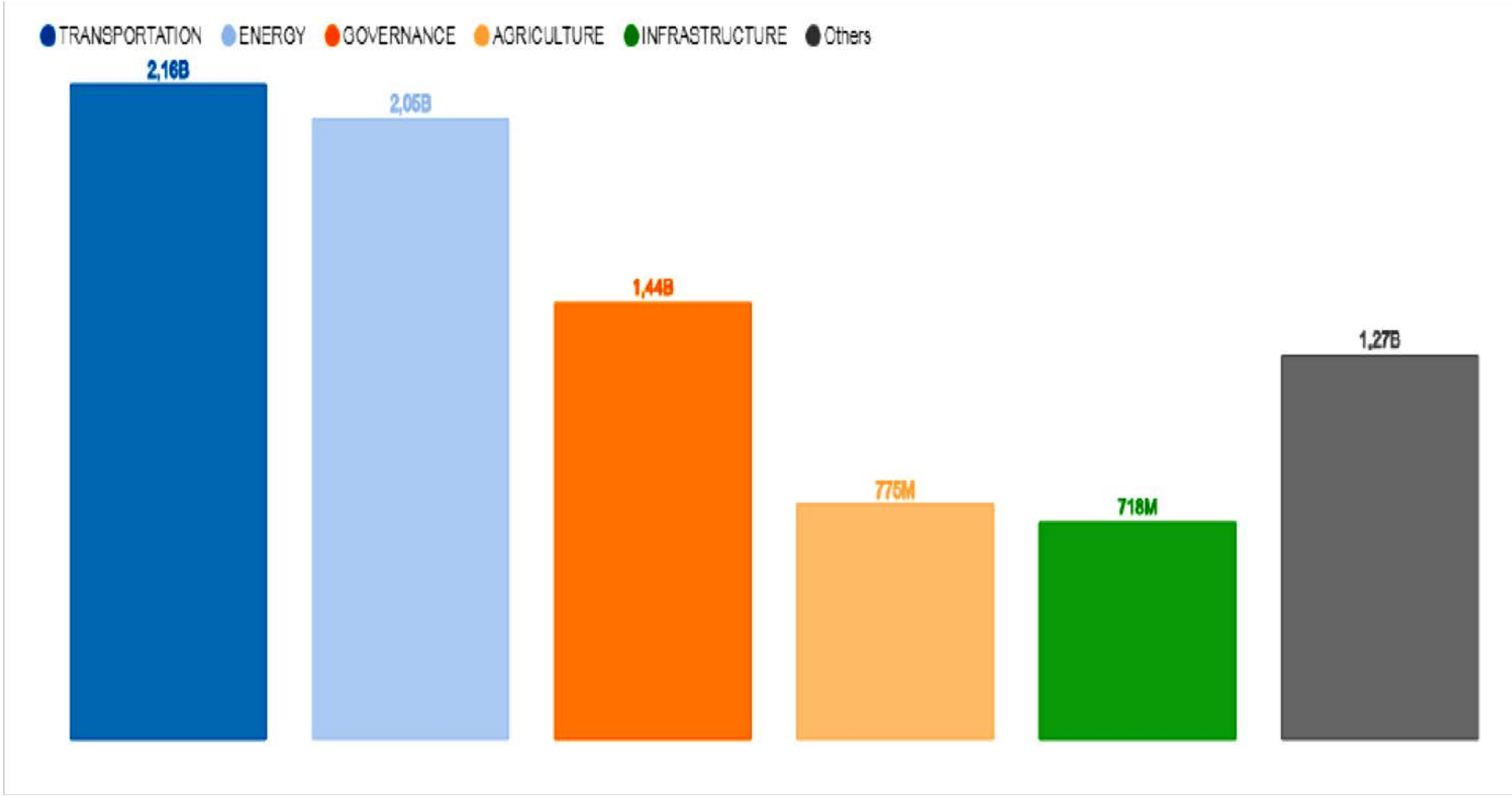
* Bulletin of the National Bank of Kyrgyz Republic

Foreign development assistance to the Kyrgyz Republic (1992-2017)



Source: Aid Management Platform for the Kyrgyz Republic

Top sectors receiving FDA



Source: Aid Management Platform for the Kyrgyz Republic

PUBLIC-PRIVATE PARTNERSHIP IN KYRGYZSTAN (1)

- Adoption of the Law “On Public-private partnership in Kyrgyz Republic” in 2012
- According to the Law:
  - PPP applies to infrastructure facilities and / or infrastructure services in such sectors as: energy, petrol, gas, transport, road and railroad, public utilities, medical and other services in health sector, education, culture and social services.
  - But it does not apply to
    - the use of mineral resources
    - government procurement
    - privatization

PUBLIC-PRIVATE PARTNERSHIP IN KYRGYZSTAN (2)

- The law envisages two mechanisms to support PPP

State financial support	Economic support
• Provision with the loans on concessional terms, • Credit guarantees • Tariff subsidies etc.	• Granting rights to movable or immovable property, • Assistance in obtaining licenses, permits, approvals; • Establishment of preferential rental rates for the use of property, state and / or municipal property etc.

PUBLIC-PRIVATE PARTNERSHIP IN KYRGYZSTAN (2)

- Fund for Financing the Preparation of Public-Private Partnership Projects created in 2014 , with the support of the Asian Development Bank (ADB)
  - Fund received $ 2 million in 2014, $ 1 million in 2015, and $ 1 million in 2016 to promote PPP projects.

- PPP projects in health sector: The dialysis center of Fresenius Medical Care Kyrgyzstan (October 2018)

- Creation of the infrastructure financing fund is noted as one of the main tasks up to 2021

EMPIRICAL ANALYSIS OF INFRASTRUCTURE INVESTMENT IMPACT

Challenges in selection of infrastructure investment project for evaluation

- Most of them were launched after 2000s and still under implementation.
- Road construction investments are realized by parts through financial support from different international donor organizations.
- From the methodological standpoint of impact evaluation project should be:
  - Completed
  - Sufficient time after completion for short-term, mid-term and long-term analysis
  - Represent opportunity for control and treatment grouping
- During the recent years, several important projects have been launched, which have regional strategic importance and considered within CAREC corridors

Road construction investments in Kyrgyzstan

	Length (km)	Regions covered	Status	Strategic content
BISHKEK – NARYN – TORUGART	539	Chui Issyk-Kul Naryn	Most part completed, some parts under construction	CAREC 1 corridor
OSH-BATKEN-ISFANA	358	Batken Osh.	Not completed, several parts under construction	Improved transport connections to Uzbekistan, Tajikistan, China.
TARAZ-TALAS-SUUSAMYR	199	Talas Chui	Not completed, 3rd phase under construction	Improvement of intraregional connections and to Kazakhstan
OSH-SARYTASH-IRKESHTAM	258	Osh	Completed. Project duration 2007-2012	CAREC 2 corridor
SARYTASH-KARAMYK	136	Osh	Completed. Project duration 2008-2012	CAREC 4 and 5 corridor


KYRGYZSTAN
Political Map
KAZAKHSTAN
Bishkek
Tokmok
CHUY
Talas
TALAS
Karakol
YSYK-KOL
JALAL-ABAD
NARYN
Naryn
UZBEKISTAN
Jalal-Abad
Osh
OSH
CHINA
Batken
BATKEN
0 100 200 Km
0 100 Miles
TAJIKISTAN
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(Updated on 18th March, 2016)
LEGEND
International Boundary
Region Boundary
National Capital
Region Capital

Section	km	Completion	Financing Source
Gulcha–Sopu-Korgon	43	2011	Islamic Development Bank
Sopu-Korgon–Sary-Tash	67	2012	Export-Import Bank of China
Sary-Tash–Irkeshtam (PRC border)	50	2011	China Development Bank
Sary-Tash–Karamyk (Tajikistan border)	136	2012	Asian Development Bank

METHODOLOGY (1)

- Difference-in-difference approach (Yoshino and Abidhadjaev, 2017; Yoshino and Pontines, 2015)
- Measurement of treatment unit at:
  - Regional (oblast) level
  - District (rayon) level

- Regional level:

  - Administrative structure of Kyrgyzstan consists of 7 oblasts, which limits selection of control groups

  - Treatment group - Osh region, remaining 5 regions of the country are used as control groups (Bishkek and Osh cities and Chui oblast are excluded)

  - Limited control group sample: these roads are not the only road in the region that may have impact on social and economic conditions of the region, during the observed period - other regions may not represent good sample of unaffected or control group

METHODOLOGY (2)

- District (Rayon) level:
- Three treatment group formulations

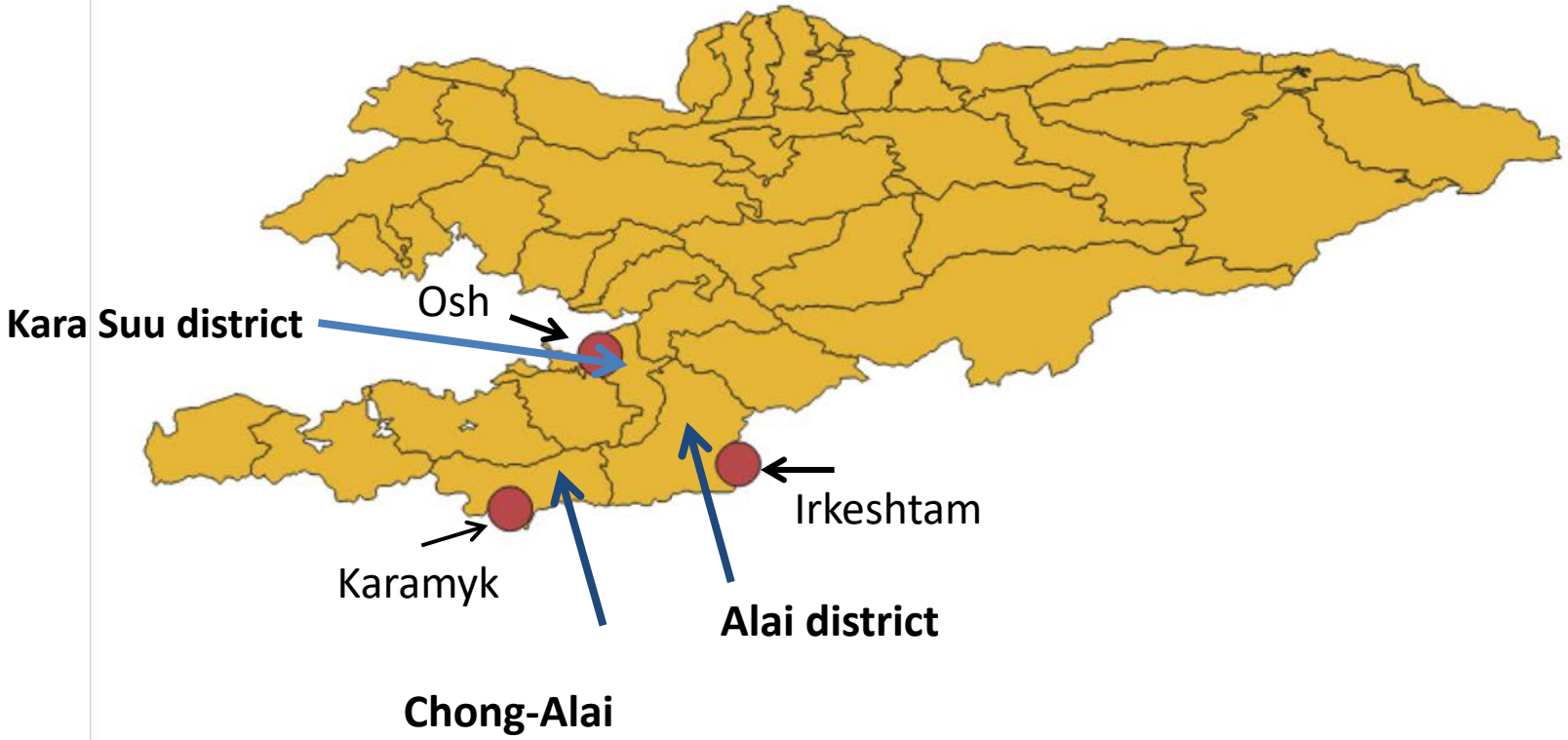
1. All three districts located within the road route:
   Kara Suu, Alai and Chong Alai districts

2. Only two districts – Alai and Chong Alai
   - These two districts are most remote and mountainous, that may conditioned their social and economic structure.
   - Karamyk and Irkeshtam as terminal points of these roads located in these two district.

3. Alai district only

- Control groups- other districts (34 districts)

- Disadvantages:
  - Data unavailability at the district level
  - Potential spillover effect of the infrastructure projects to other districts too (may be in bordering Tajikistan and China ?)


Kara Suu district
Osh
Irkeshtam
Karamyk
Alai district
Chong-Alai

METHODOLOGY (3)

Basic estimation equation:

$$Y_{it} = \beta_0 + \beta_1(T * D_{treated}) + \beta_2 X_{it} + \varepsilon_{it}$$

- Y - outcome variable
- T – treatment before and after (t=0 before the treatment, t=1 after the treatment)
- Binary variable $D_{treated}$ - shows treated regions, which is the Osh oblast at the regional level, and Kara Suu, Chon Alai and Alai districts at the district level analysis.
- T* $D_{treated}$ - is an interaction term between treatment variable and treated region, while β_3 is the Difference-in-difference estimator.
- The X_{it} - vector of control variables (time-variant)

Regional level

- Outcome variable
  - Gross Regional Product (GRP)
  - Agricultural output
  - Industrial output
  - Poverty rate
  - Passenger turnover
  - Carriage of goods by road (Cargo)
- Control variable
  - Population
  - Investment
  - Microcredit
  - Export
  - Consumer price index (CPI)

District level

- Outcome variable
  - Industrial output growth rate
  - Retail trade growth rate
  - Passenger turnover
  - Carriage of goods by road
- Control variables:
  - Population

Pre-construction and Post-construction periods

- Panel data for 2005-2017
- First parts of these roads construction started in 2007 and 2008 and completed in 2012
- Construction of the road by parts - when significant part is implemented, but not completed yet, it may have some effects even before the completion
- For the robustness purposes use of two different pre-construction periods and following three post-construction periods:

	Pre-construction	
	2005-2010	**2005-2012**
Post-construction:		
▪ Short-term	2011	2013
▪ Medium-term	2012-2013	2014-2015
▪ Long-term	2014-2017	2016-2017

Descriptive statistics of groups and variables (regional level)

	All regions		Control regions		Treated region	
	Obs.	Mean	Obs.	Mean	Obs.	Mean
GRP	72	19311.9	60	18638.25	12	22680.0
Industrial output	78	8655.1	65	9901.009	13	2425.5
Agricultural output	78	17597.7	65	15770.28	13	26734.8
Cargo transportation by road	78	2.1	65	1.927692	13	2.7
Passenger turnover of automobile (millions of passenger -kilometers)	78	436.2	65	409.7	13	568.4
Poverty level	78	39.5	65	39.51554	13	39.1
Investment in fixed capital	78	4648.6	65	5044.17	13	2670.9
Microcredits	78	1655.2	65	1499.941	13	2431.4
Export	78	1612.1	65	1654.282	13	1401.5
Population	78	0.6	65	0.488657	13	1.1
CPI	78	108.9	65	108.5834	13	110.2

Descriptive statistics of groups and variables (district level)

	All regions		**Control regions**		**Treated regions (Kara Suu, Chon Alai, Alai)**	
	Obs	Mean	Obs.	Mean	Obs.	Mean
Cargo transportation by road	518	289.11	476	270.16	42	503.92
Passenger turnover of automobile (millions of passenger - kilometers)	518	93.03	476	91.41	42	111.44
Industrial output growth rate	420	6.74	384	6.43	36	10.08
Retail trade growth rate	444	10.76	408	10.59	36	12.73
Population	432	90.95	396	84.77	36	158.97

ESTIMATION RESULTS

Table 1. Difference-in-Difference estimation results for oblast level

	GRP	Agricultural output	Industrial output	Poverty rate	Passenger turnover	Cargo
Pre-construction period 2005-2010						
$D_{Osh} \times D_{2011}$	0.154	0.27	-0.6946	-3.3966	-0.0443	0.13
$D_{Osh} \times D_{2012\text{-}2013}$	-0.116	0.2521	-1.0066	-0.3411	-0.1309	-0.175
$D_{Osh} \times D_{2014\text{-}2017}$	0.094	0.3454***	-0.6814	-24.409***	-0.1217	-0.136
Pre-construction period 2005-2012						
$D_{Osh} \times D_{2013}$	-0.101	0.187	-0.7244	-6.1424	-0.0669	-0.121
$D_{Osh} \times D_{2014\text{-}2015}$	0.075	0.2533	-0.4707	-18.714***	-0.0528	-0.067
$D_{Osh} \times D_{2016\text{-}2017}$	0.1273	0.3557**	-0.616	-30.446***	-0.1552	-0.19

Table 2. Difference-in-Difference estimation results for Pre-construction period 2006-2010 (district level)

	Cargo	Passenger turnover	Industrial output growth rate	Retail and trade growth rate
Kara-Suu, Alai and Chon-Alai				
$D_{rayons} \times D_{2011}$	47.424	2.1903	4.0641	15.9281*
$D_{rayons} \times D_{2012\text{-}2013}$	23.2413	3.918	-8.8286	-5.5695
$D_{rayons} \times D_{2014\text{-}2017}$	-65.435**	-1.2361	-6.4259	-7.9667*
Alai and Chon-Alai				
$D_{rayons} \times D_{2011}$	25.0973	-2.2422	8.1117	23.1635**
$D_{rayons} \times D_{2012\text{-}2013}$	19.3999	-3.1721	-9.6626	-6.5097
$D_{rayons} \times D_{2014\text{-}2017}$	-83.867**	-3.9229	-6.9738	-10.0435*
Alai				
$D_{rayons} \times D_{2011}$	88.3284	-5.0641	13.9653	32.2323**
$D_{rayons} \times D_{2012\text{-}2013}$	69.8991	-6.8112	8.3136	1.8332
$D_{rayons} \times D_{2014\text{-}2017}$	-93.650*	-9.4307	-13.59	-6.49

Table 3. Difference-in-Difference estimation results for Pre-construction period 2006-2012 (district level)

	Cargo	Passenger turnover	Industrial output growth rate	Retail and trade growth rate
Kara-Suu, Alai and Chon-Alai				
$D_{rayons} \times D_{2013}$	-84.7596*	1.988	-7.8898	-9.4097
$D_{rayons} \times D_{2014\text{-}2015}$	-88.1522**	-0.2742	-2.6818	-6.9505
$D_{rayons} \times D_{2016\text{-}2017}$	-89.0539**	-4.4996	-9.5315	-10.5818*
Alai and Chon-Alai				
$D_{rayons} \times D_{2013}$	-111.7970*	-2.4912	-8.7592	-10.825
$D_{rayons} \times D_{2014\text{-}2015}$	-110.176**	-2.7988	-1.5837	-9.9465
$D_{rayons} \times D_{2016\text{-}2017}$	-100.301**	-3.5302	-12.108	-12.118
Alai				
$D_{rayons} \times D_{2013}$	-140.239*	-5.5083	-4.4221	5.5206
$D_{rayons} \times D_{2014\text{-}2015}$	-138.949**	-6.804	-3.1732	-9.8281
$D_{rayons} \times D_{2016\text{-}2017}$	-138.034**	-8.7776	-27.175	-5.9766

FINDINGS

- The infrastructure project has some positive social and economic impacts (poverty and retail trade)
- Negative effect on carriage of goods by road – is conditioned by the general economic conditions and external trade with China and transit of goods
  - For instance, after the 2008 crisis and further movement towards the Eurasian Economic Union, can be reflected in decrease of the cargo by road
- Data restrictions for proper impact evaluation
- Outcome variables can be affected by other conditions

CONCLUSIONS

- Major role in infrastructure investment in Kyrgyzstan context is carried out by the international organizations, where large share of financial resources are loans

- Public-private partnership mechanism is not well-developed in Kyrgyzstan
  - Development of long-term funding mechanisms for PPP

- One of the main constraints faced by the potential private investors are the institutional weakness that cause low transparency and corruption

CONCLUSIONS

- Efficiency of impact of infrastructure investments – long-term sustainable economic spillover effects – creation of the business ecosystem along the road.
  - Other comprehensive measures are needed:
    - For instance: international road construction should be accompanied by the lowering barriers on borders and external trade promotion initiatives

THANK YOU !!!