

Economic Impact of The Sardoba Dam Failure on Syrdarya Region: A Mixed Methods Assessment

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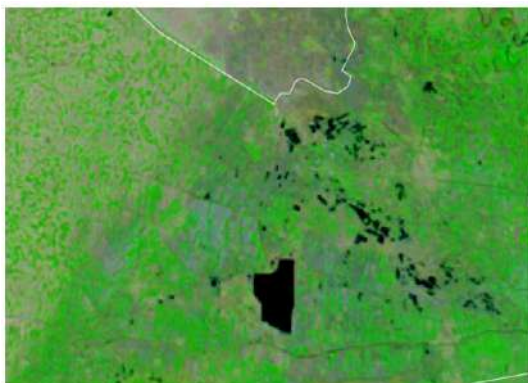
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The Sardoba Dam Failure

- 1st May, 2020
- 120 000 ha (4.3xKabul, 1.7xAstana, 9.4xBishkek, 9.5xDushanbe)
- The volume of water lost could exceed 500 million cubic meters (m³) of the 922 million m³
- 4 people died, 60 brought to hospitals and 92,000 relocated in Uzbekistan. In Kazakhstan 32,000 people were relocated to outside the flooded region.

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Satellite pictures of the Sardoba Reservoir before and after the accident, NASA



30th April



7th May

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Press Service of President Administration

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Research Questions

- How did economic situation changed in the area after the dam accident?
 - How did the Sardoba dam failure affect the prices in the area?
 - How did the Sardoba dam failure affect the external trade in the area?
- How do local victims feel about their life and well-being changed because of the dam accident?

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Literature Review

Author	Ellingwood et al.	U.S. Bureau of Reclamation	Nishijima and Rocha
Title	Assesing Cost of Dam Failure (1993)	Economic Consequences Methodology for Dam Failure Scenarios (2009)	An economic investigation of the dengue incidence as a result of a tailings dam accident in Brazil (2020)
Methodology	accounting stance, damage to fixed assets, loss of income, intangible losses, and loss of life	general equilibrium models: CGM	Pre-Post Simple difference Difference in Difference
Description	monetary outcomes, rather than showing the effect of the dam failures on social-economic indicators of the effected region	dam benefit losses downstream property damages and dam repair/replacement costs	Marianna dam failure effect to dengue fever. Those who were near to the dam had 19% point more probability of having dengue disease than those who were 200 km radius away from the accident point

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Data & Methodology

- 2019, D.Berdiklichev & S.Inogomov
- 91% correlation with CPI
- Ingredients:
 - 1 kg rice
 - 0.5 kg beef
 - 0.5 kg lamb
 - 1 kg carrot
 - 0.3 kg onion
 - 0.15 l sunflower-seed oil
 - 0.15 l cotton oil



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Data Description

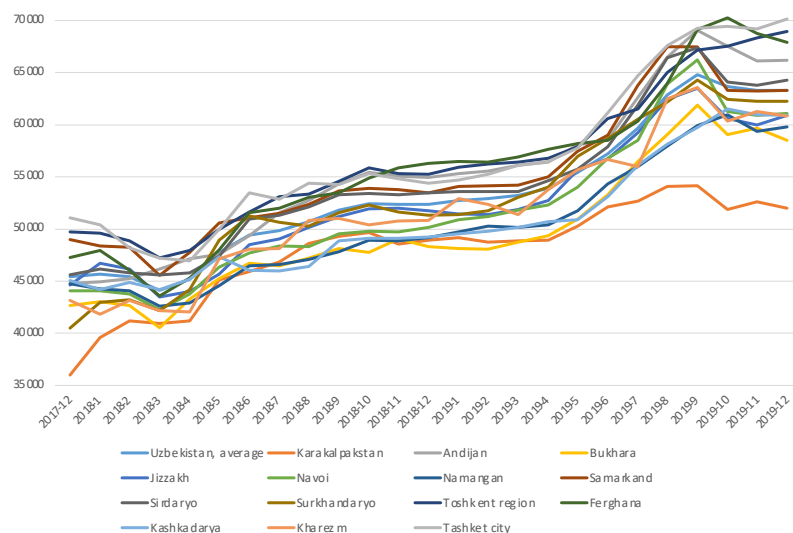
- for quantitative part: secondary data (CBU, Stat. Com.)
 - Price of Plov (CBU, Stat. Com.), monthly, 2017m12 – 2021m2, 99.91% with PI

$$= 0.5\text{kg} * (\text{BeefPrice} + \text{LambPrice}) + 1\text{kg} * (\text{RicePrice} + \text{CarrotPrice})$$
 - External Trade (Stat. Com.), monthly, 2018m01 – 2021m4
 = Import + Export
- for qualitative part: primary data (interviews, observations)

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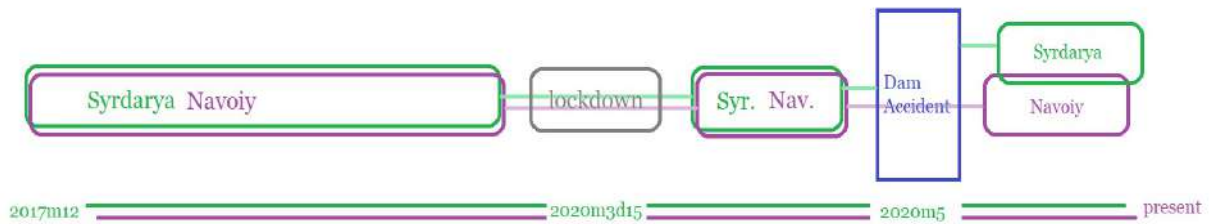
COVID-19 problem and Counterfactual

- lockdown 1.5 month before the accident
- Lowest correlation with Syrdarya is 89%
- Navoiy region prices: 99.3% correlation with Syrdarya prices



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Conceptual Framework (multiple group interrupted time series analysis)



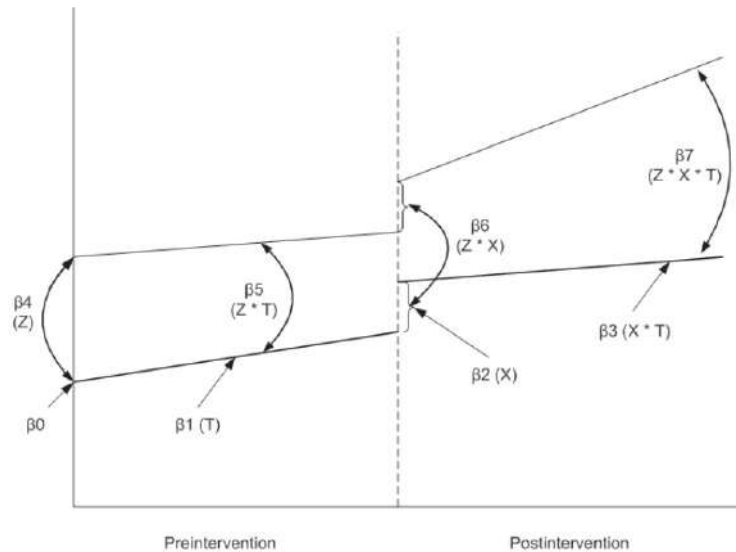
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Model

$$Y_t = \beta_0 + \beta_1 T_t + \beta_2 X_t + \beta_3 X_t T_t + \beta_4 Z + \beta_5 Z T_t + \beta_6 Z T_t + \beta_7 Z X_t T_t + \epsilon_t$$

- Y_t = aggregated outcome variable measured at each equally spaced time point t
- T_t = time since the start of the study
- X_t = dummy variable representing the intervention (pre-accident periods = 0, post-accident = 1)
- $X_t T_t$ = interaction term
- Z = cohort assignment dummy (treatment=1, control=0)
- $Z T_t, Z T_t, Z X_t T_t$ = interaction terms using Z

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Linden and Arbor (2015)

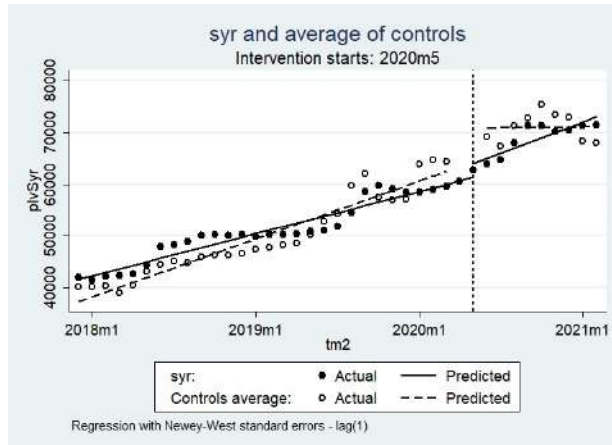
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Qualitative Research Design (semi-structured)

Whom (with)?	<ul style="list-style-type: none"> Local people of Syrdarya region, victims of Sardoba dam accident
What (about)?	<ul style="list-style-type: none"> Introductory questions. How well-being changed? How your daily life changed? What is different now, after accident? Gain vs. loss Did you feel price increase after the accident?
When?	<ul style="list-style-type: none"> 26.07.2021 – 15.08.2021
Where?	<ul style="list-style-type: none"> Sardoba (damaged villages, bazaars etc.) Navoi region: Karmana, Toshrobot, Beshrobot districts
Why?	<ul style="list-style-type: none"> In order to know the true effect of Sardoba dam failure on daily life and well-being of victims
How?	<ul style="list-style-type: none"> All Interviews are transcribed and translated; coded in MAXQDA software. Participant observations will be initially documented into fieldwork notebook, afterwards, only relevant to topic parts will be reflected in the thesis with analysis.

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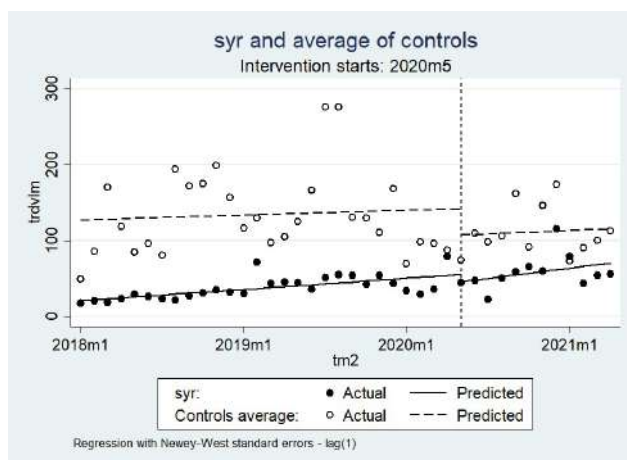
Results (PI)



	(1)
VARIABLES	_plvSyr
_t	930.3*** (67.45)
_z	4,260*** (1,062)
_z_t	-251.4*** (77.89)
_x2020m5	6,388** (2,638)
_x_t2020m5	-901.5** (418.9)
_z_x2020m5	-3,730 (2,946)
_z_x_t2020m5	1,217*** (453.3)
Constant	37,411*** (846.1)
Observations	76

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Results (Trade Volume)



	(1)
VARIABLES	_trdv/m
_t	0.534 (1.529)
_z	-106.5*** (21.89)
_z_t	0.709 (1.564)
_x2020m5	-34.90 (29.81)
_x_t2020m5	0.205 (2.650)
_z_x2020m5	25.15 (31.53)
_z_x_t2020m5	0.790 (3.100)
Constant	127.3*** (21.64)
Observations	80

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Results (Interviews)

New houses + compensation

- new apartment or renovation of house
- fridge, TV, washing machine, house boiler, gas stove
- 40 million sum compensation
- urban life
- renovated schools

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Results (Interviews)

Water and natural gas provision:

- no usage of firewood or coal
- combined with house boiler they are providing heating system
 - *"I remember my husband said once, 'It has been ages that I went to sleep without warm casual clothes in winter'"* (referring to the fact that last winter it was really nice and warm in their house)
- it is cheaper
- better sanitation
 - *'Our kids are wearing clean clothes. I mean, as a teacher I can see that children are all clean and shining. Before, kids used to have a shower every two weeks maybe.'*

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Results (Interviews)

Unemployment

“Before the accident, women used to gather somewhere and talk about crucial important stories happening around. Now, look, all men are out and gathering everywhere during a light day. Unemployment. No facilities to keep cattle, no place to grow something. Everyone had at least 2-4 cattle.”

- they do not have land
 - land was given to Agro Cluster Company: *“Before, one farmer could hire 10-30 people, now, in one cluster only one person works.”*
- no facilities to keep cattle
- they used to be busy with peasantry and keeping cattle

Results (Interviews)

Prices

- *“To be honest, I do not know”*
- less cattle, less peasantry
- less farmers
 - *“**Productivity** of land decreased after the accident. Before people used to grow **potato, onion, rice** in these areas. Now nothing is growing. In all these areas, where accident happened, nothing is growing well. Canals are dry or destroyed at all, not in working conditions. Nearby no any products are being grown. Therefore, **we had to bring it from other regions**. Naturally, prices are higher. **Everything is 1000 sum more expensive here.**”*

Results (Interviews)

Sudden urbanization “problem”

- very rapid transformation of rural areas into urban
- increased living expenses
 - *“In order to live in this new fancy facilities people should work, even more than before.”*
- reduced income
 - *“People who used to live with rural life were transformed to urban life. However, now they are still earning money from rural life, and they are earning even less than before because of unemployment and not owning a land. Life conditions are as if we are in the city, but no jobs to afford these facilities. This is because government took all land and created cluster company. They do not want to hire us. Maybe just 10-15 people.”*

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Results (Interviews)

Panic and health issues

- people are scared
- fake dam failure incident (14th January, 2021)
 - *“Many people had issues with their health. Some people died even, because of bad news. Some people’s blood pressure increased. Heart attack etc..”*
 - *“Diabetics increased”*
- Melancholy
 - *“Millions of money cannot give back the **spirit of people**. However, their **mood is good**... Mood is very flexible. But if you lose your spirit, it is very difficult to be ok over again.”*
 - *“The worst thing was that the accident did harm people physiologically, people got scared very much. I remember the noise of the water coming. Noise, cold came first. I could hear how water was destroying everything on its way. That was scary. I think we never forget that day.”*

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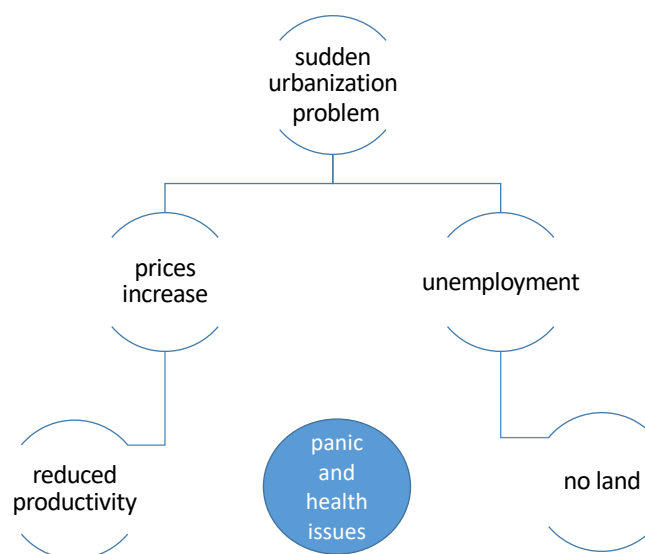
Results (Interviews)

Grateful

- *“It would not be the same”*
- Gratitude to government and president
 - *“The most supportive thing we have seen is that president himself came here on accident day and he stayed in this village three days.”*
- grateful that they and their relatives are alive
 - *“Everything is good. I am not complaining. If I complain, that would be rude. We are alive, that is the most important thing.”*
- People are happier
 - *“We are happier than ever.”*

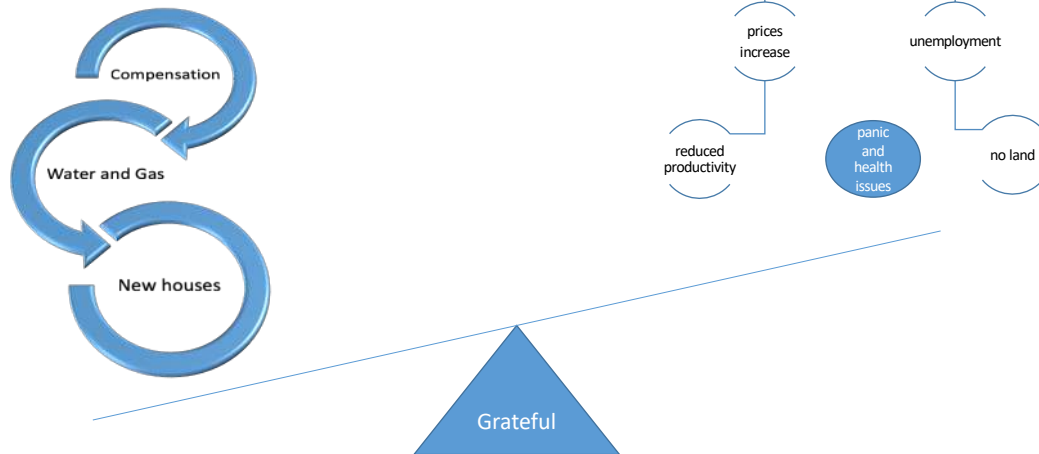
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Overview



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Overview



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Conclusions

- There is statistically significant change in prices due to dam accident.
- There is not statistically significant change in external trade due to dam accident.
- Living conditions of people from accident area improved dramatically because of **rapid reforms** in Syrdarya.
- People consider themselves happier and grateful what they have right now, although unemployment, inflation and “sudden urbanization problem” exist.

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Thank you

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