

# Foreign Mining, Labor Welfare and Local Trust: Evidence from Kyrgyzstan Gold Mine

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# Introduction

- Case of Kumtor, Kyrgyzstan's dominant natural resource FDI.
- Geolocated data, 5 years' household panel survey.
- Research question: Why the economic growth of foreign mines in developing countries can cause local controversy?
- In this case: Foreign mining / Higher gold revenue causes
  - Mining workers better wages, social benefits.
  - Inequality and social division.
  - Lower trust in local authority by mining workers.
  - Higher trust in local authority by non-mining families.

# Extractive Industry of Kyrgyzstan



- Kumtor (Canadian). Largest company. Foreign owned gold mine.
- 10% employment. 90% of the country's gold production. 12.5% of Kyrgyzstan's GDP in 2020. (EITI report)
  - Centerra (Canadian) holds a 100% interest in the Kumtor Mine.
  - State owned enterprise Kyrgyzaltyn holds 32.75% share. (Centerra)
  - General tax 13% percent of gross income.

# Frequent Protests



- 10 large uprisings in 15 years (Kumtor News Release 2005 - 2020)
- Two national uprisings related to Kumtor
- Low social trust, who against who unknown

## Main Question

- Why? Because people not well treated? Not really!
- **The main question:** if higher salaries paid, why local resistance?
- **Key finding:** foreign-invested mine **undermines the trust** of the **beneficiary mining industry** in local communities.
- Why? larger inequality and social division.
- Beneficiaries: mining industry and state elites.  
Victims: local governments and local community.

Higher welfare of miners:

- Large Foreign mining companies, high labor demand, high profit.  
**higher salary.** (Harrison and Scorese 2010).

# Mechanism

Lower trust of miners in local leaders:

- Fiscal system highly centralised. Foreign companies pay more to the center.(Luong and Weinthal 2010)
- State collects revenue and dividends from Kumtor.
- Local government collects tax indirectly.
- State-Mining Sector (Direct claimant of company revenue)
  - State elites and mining workers can benefit from mineral wealth through state ownership and revenue.
  - Lower trust in local leaders by miners.
- Local-Non Mining Sector (Indirect claimant of company revenue)
  - Local communities benefit from mineral wealth only through partial taxes.
  - Higher trust by others workers.

# Hypotheses

## Hypotheses 1

- Mining workers who live closer to Kumtor mining pit have higher income and better social security.
- Non-mining working family who lives closer to Kumtor mining pit don't have higher income and better social security.

## Hypotheses 2

- Mining workers who live closer to Kumtor mining pit have lower trust to local authority.
- Non-mining working family who lives closer to Kumtor mining pit have higher trust to local authority.



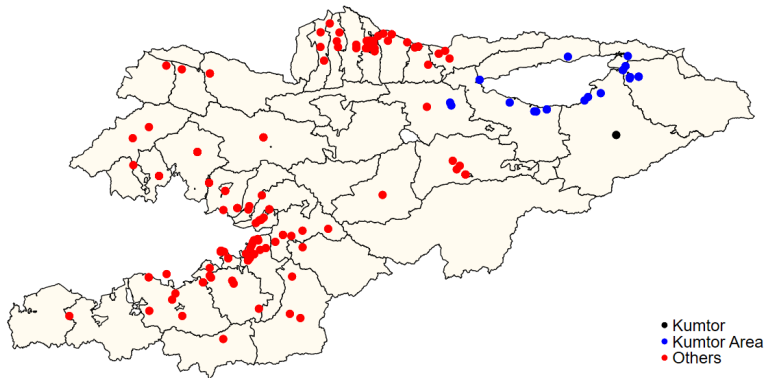
## Life in Kyrgyzstan

- The same 3000 households and 8000 individuals
- All seven Kyrgyz regions (oblasts) and the two cities of Bishkek and Osh and are addressed
- Representative nationally and at the village level .
- Questions about household demographics, assets, expenditure, migration, employment, agricultural markets, shocks, social networks, subjective well-being, and many other topics.
- Five waves in 2010, 2011, 2012, 2013 and 2016.

# Towns in Survey

## Kyrgyzstan Kumtor and LiK Households

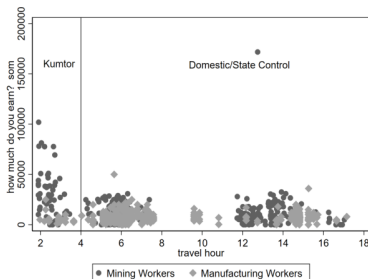
Kyrgyzstan, 2010-2016



# Empirical Specification

- X-axis: Driving time from Mining Deposit to Workers' Household (Google Map) / Y-axis: Income of Workers
- Foreign  $\times$  Mining

Figure 1: Income of Mining Workers and Manufacturing Workers



## Welfare and Trust Effect of Kumtor by Distance

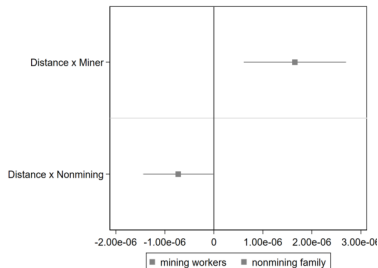
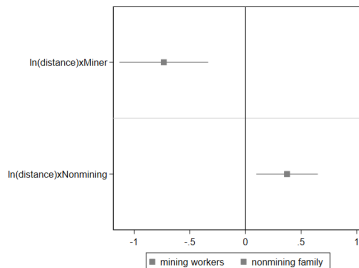
$$Y_{idt} = \beta_0 + \beta_1 \text{LnDistance}_{idt} + \beta_2 \text{Miner}_{idt} + \beta_3 \text{LnDistance}_{idt} \times \text{Miner}_{idt} + \theta_d + \gamma t + \epsilon_{idt}$$

- Dependent Variable:
  - $\ln(\text{income})$ ; trust in local authority(1-4); i.written contract, i.job training, i.social security.
- Independent Variable:
  - $\text{LnDistance}_{idt}$ :  $\ln(\text{distance to Kumtor})$ .
  - $\text{Miner}_{idt}$ : job identifier.
  - $\text{Nonminer}_{idt}$ : no one in household works in mining.
- Control Variable: Year (t) and District (d) fixed effects, demographic characteristics
- Logit regression if  $Y_{idt}$  is a dummy.

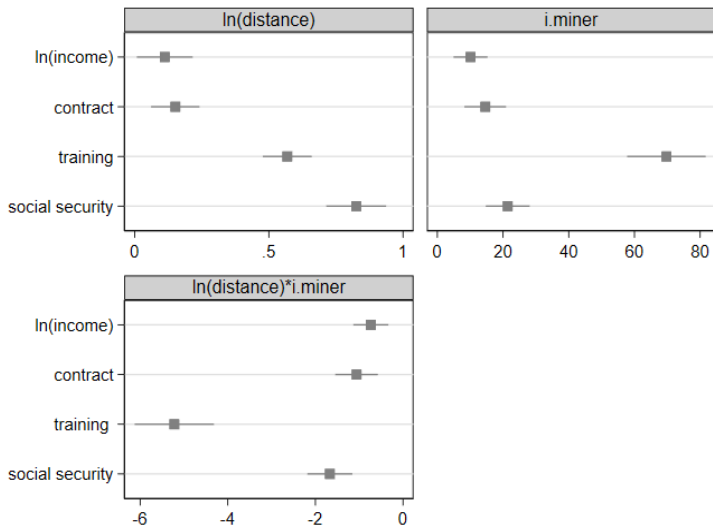
# Coefficient plot of Kumtor's effect on income, interaction term

$$Y_{idt} = \beta_0 + \beta_1 \ln Distance_{idt} + \beta_2 Miner_{idt} (Nonminer_{idt}) + \beta_3 \ln Distance_{idt} \times Miner_{idt} + \theta_d + \gamma t + \epsilon_{idt}$$

- Left: Welfare Effect (H1)  $\beta_2 > 0$   $\beta_3 < 0$  (Miners)  $\beta_2 < 0$   $\beta_3 > 0$  (Non-mining Family Workers)
- Right: Trust Effect (H2)  $\beta_2 < 0$   $\beta_3 > 0$  (Miners)  $\beta_2 > 0$   $\beta_3 < 0$  (Non-mining Family Workers)

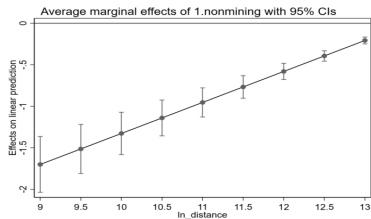
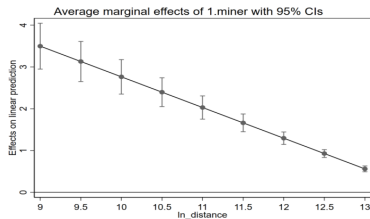


# Coefficient plot of Kumtor's effect on miners' welfare

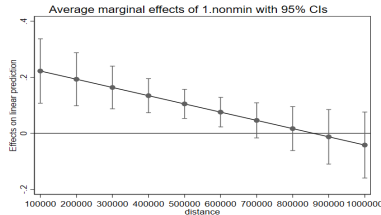
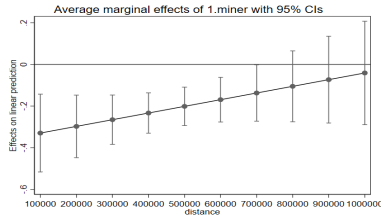


# Marginal effect of distance on income and trust

## Marginal effect of distance on income



## Marginal effect of distance on trust in local leaders



## Robustness Checks

- Self-selection problem: Propensity Score Matching. (Demographic characteristics and distance)  
✓ Consistent Result
- Gold prices and gold production as the exogenous shock.  
✓ Consistent Result (In appendix)
- Evaluate lag effect of gold shock.  
✓ Consistent Result
- Distance to alternative domestic mines as a counterfactual.  
? In Progress, Preliminary consistent Result



## Conclusion and Questions

- Because the way of profit distribution. Foreign mining creates different interest groups.
- Mining workers higher wages, better social security, had lower levels of trust in local leaders.
- Other sectors had higher levels of trust in local leaders.
- Questions:
  - (Skill) higher and unskilled same impact.
  - (Migrants) only 10 percent migrants.
  - (Ethnicity) most kyrgyz.
  - (Protests) limitation of participation data, another project.

Thank You!

Tables are in Appendix



# Hypotheses - Extended

## Hypotheses 3

- If mining income or gold prices rise, the income and social welfare of mining workers will increase, and the impact will be prominent for those living near the Kumtor mine.
- If mining income or gold prices rise, the income and social welfare of non-mining family workers will not increase.

## Hypotheses 4

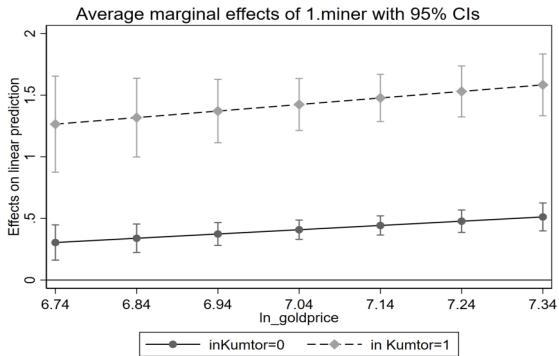
- If mining income or gold prices rise, the trust in local authority of mining workers will decrease, and the impact will be prominent for those living near the Kumtor mine.
- If mining income or gold prices rise, the trust in local authority of non-mining workers will increase, and the impact will be prominent for those living near the Kumtor mine.

## Welfare Effect of Kumtor by Mining Activity

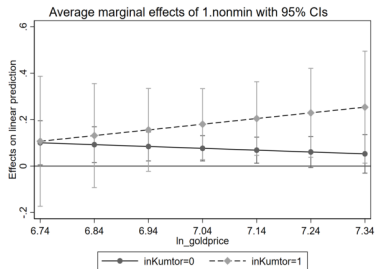
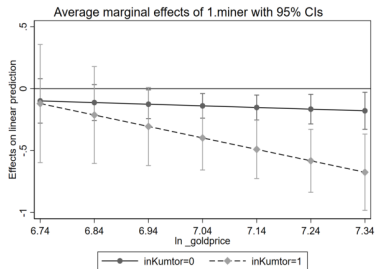
$$Y_{idt} = \beta_0 + \beta_1 Kumtor_{id} + \beta_1 Miner_{idt} + \beta_3 Kumtor_{id} * Miner_{idt} + \beta_4 \ln M_{t-2} * Kumtor_{id} + \beta_5 \ln M_{t-2} * Kumtor_{id} * Miner_{idt} + \theta_d + \gamma t + \epsilon_{idt}$$

- Control Variable: Year (t) and District (d) fixed effects, demographic characteristics.
- Logit regression if  $Y_{idt}$  is a dummy.
- Dependent Variable:
  - $Y_{idt}$  log of income / trust in local leaders
- Independent Variable:
  - $M_t$ : annual gold production, annual gold income, annual average price of gold and Region Development Fund.
  - Lagged by one or two years.
  - $Kumtor_{id}$  is a dummy if lives within 4 hours to the pit.
  - $Miner_{idt}$  is the job identifier
  - $Mfg_{idt}$ : dummy if works in manufacturing.

# Gold Price on Income: In and Out



# Mining V.S Non-Mining On Trust



# Empirical Specification Results

Table 1: Income effect of Kumtor

VARIABLES	(1) income	(2) income	(3) contract	(4) training	(5) social security	(6) health
ln_dis×miner	-0.766*** (-4.61)		-1.209*** (-4.12)	-4.232*** (-8.28)	-1.408*** (-4.99)	-0.435** (-2.67)
ln_distance	0.132** (2.93)	-0.330* (-1.89)	0.179*** (2.91)	0.568*** (9.13)	0.820*** (10.73)	0.173 (0.71)
miner	10.481*** (4.90)		16.577*** (4.34)	56.818*** (8.42)	18.196*** (4.98)	6.133** (2.96)
non-miner		-6.261** (-3.10)				
ln_dis×nonminer		0.462** (2.99)				
Year FE	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y
Observations	11,748	11,748	14,198	14,198	13,426	41,013
R-squared	0.176	0.167				0.025

Robust t-statistics in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

# Empirical Specification-Results

Table 2: Trust Effect of Kumtor

VARIABLES	(1) pres.	(2) local leader	(3) pres.	(4) local leader	(5) pres.	(6) local leader
Kumtor	0.227*** (5.35)	-0.034 (-0.26)	0.163 (1.70)	-0.239 (-1.46)	0.226*** (5.42)	-0.049 (-0.37)
miner	-0.052 (-0.56)	0.007 (0.07)				
Kumtor×miner	-0.119 (-1.38)	-0.478*** (-4.14)				
nonminer			-0.021 (-0.23)	-0.057 (-0.70)		
Kumtor×nonm.			0.065 (0.79)	0.209* (2.28)		
mfg.					-0.036 (-0.56)	-0.284*** (-4.52)
Kumtor×mfg.					-0.131 (-1.03)	0.288** (2.41)
Year FE	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y
Observations	39,279	39,164	39,279	39,164	39,279	39,164
R-squared	0.078	0.005	0.078	0.005	0.078	0.008

Robust t-statistics in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$



# Empirical Specification-Results

Table 3: Income effect of Mining Activity

VARIABLES	(1) income	(2) income	(3) income	(4) income	(5) income	(6) income
miner×ln_M×Kum	-0.153 (-0.74)	-0.351* (-1.88)	1.139 (1.55)	0.864*** (4.48)	0.641*** (3.93)	0.025 (0.38)
ln_M×Kum	0.210 (1.14)	0.152 (0.84)	-1.576 (-1.62)	-0.288 (-1.35)	-0.250 (-1.53)	-0.123 (-1.28)
Kumtor	-2.935 (-1.17)	-2.164 (-0.93)	20.684 (1.60)	1.870 (1.36)	1.457 (1.36)	0.041 (0.18)
miner	0.390*** (5.22)	0.390*** (5.21)	0.390*** (5.22)	0.390*** (5.22)	0.390*** (5.22)	0.376*** (5.53)
year_lagged	0	1	2	2	2	2
miner×Kumtor	controlled	controlled	controlled	controlled	controlled	controlled
ln_M	controlled	controlled	controlled	controlled	controlled	controlled
ln_M	production	production	production	goldprice	revenue	IssykFund
Year FE	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y
Observations	11,749	11,749	11,749	11,749	11,749	9,648
R-squared	0.176	0.176	0.176	0.176	0.177	0.142

Robust t-statistics in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

# Empirical Specification-Results

Table 4: Trust Effect of Kumtor Mining Activity

VARIABLES	(1) local leader	(2) local leader	(3) local leader	(4) local leader
Kumtor×miner×c.ln_M	-0.759*** (-7.46)		-0.956*** (-8.25)	
Kumtor×mfg.×c.ln_M		0.256** (2.98)		0.385*** (3.47)
miner	1.657 (0.95)		2.192 (0.97)	
mfg.		-0.568 (-0.54)		-0.761 (-0.57)
year_lagged	2	2	2	2
1.Kumtor×c.ln_M	controlled	controlled	controlled	controlled
1.sector×c.ln_M	controlled	controlled	controlled	controlled
Kumtor×1.sector	controlled	controlled	controlled	controlled
ln_M	controlled	controlled	controlled	controlled
ln_M	revenue	revenue	goldprice	goldprice
Year FE	Y	Y	Y	Y
District FE	Y	Y	Y	Y
Observations	39,164	39,164	39,164	39,164
R-squared	0.006	0.008	0.006	0.008

Robust t-statistics in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

# Empirical Specification Results

Propensity Score Matching has consistent results. Matched with the propensity scores with "age, gender, education, distance from mine, and migration status"

Table 5: Income effect of Kumtor mining- PSM weighted sample

	(1)	(2)	(3)
	ln_income	ln_income	ln_income
travel_hour	0.0132*** (3.90)	0.0197 (1.58)	-0.00449 (-0.44)
miner	1.009*** (8.03)	1.222*** (7.41)	0.701*** (8.17)
miner×c.travel_hour	-0.0643*** (-4.57)	-0.0865*** (-4.87)	-0.0344*** (-3.55)
demographic	controlled	controlled	controlled
district/year	controlled	controlled	controlled
sample	full	matched	iweight
<i>N</i>	10826	880	10680

*t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$