

# Socio-economic impact of coal mining in Mozambique

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# Motivation and context

- Mozambique is rich in natural resources but has only recently started to extract these. Coal is currently the largest export earning of the country.
- Opening of a large industrial mine may improve local infrastructure, increase local demand for services and produce and through this local economy growth benefit the well-being of the local population, but could also have detrimental effects on health and environment.
- Economic literature mostly from high-income country (Aragón, 2015), only recently studies from low- and middle-income countries (Ghana (Benshaul-Tolonen, 2019), Burkina Faso (Bazillier & Girad, 2019), sub-Saharan Africa (Kotsadam & Tolonen, 2016), 44 countries (von der Goltz and Barnwal, 2019)).

## Contributions:

- Results contribute to the discussion of local mining impact in newly producing countries.
- Paper focuses on coal mining compared to gold and therefore any difference in the results could be attributed to the resource type.

# Identification strategy

$$Y_{ipt} = \beta_0 + \beta_1 Treat_p + \beta_2 Inv_t + \beta_3 Prod_t + \delta_1 Inv_t \times Treat_p + \delta_2 Prod_t \times Treat_p + \lambda X_{it} + D_d + \gamma_t + \varepsilon_{ipt}$$

$Y_{ipt}$  : socio-economic outcome of individual  $i$  in *posto administrativo* (PA)  $p$  in time  $t$

$Treat_p$  : PA where coal mine is located (=1), PAs neighbouring provincial capital (=0)

$Inv$  : investment period

$Prod$  : production period

$X_{it}$  : controls (age, education, quarter of survey)

$D_d$  and  $\gamma_t$  : district and time fixed effects

# Data

## Household and individual level:

- National Family Budget Survey (IAF 1997/1998, IAF 2002/03, IOF 2008/09, IOF 2014/15) matched at *posto administrativo* level across years. Includes individual and household level information on consumption and poverty (national definition), health and education of children, labor market outcomes and access to basic services and infrastructure.

## Coal mines:

- Start dates of the investment and production phase for the mines are retrieved from the US Geology Survey 2000 – 2015. Geo-locations are from MIREME Mining Cadastre and matched to *posto administrativo* (PA) areas.

# Identifying assumptions

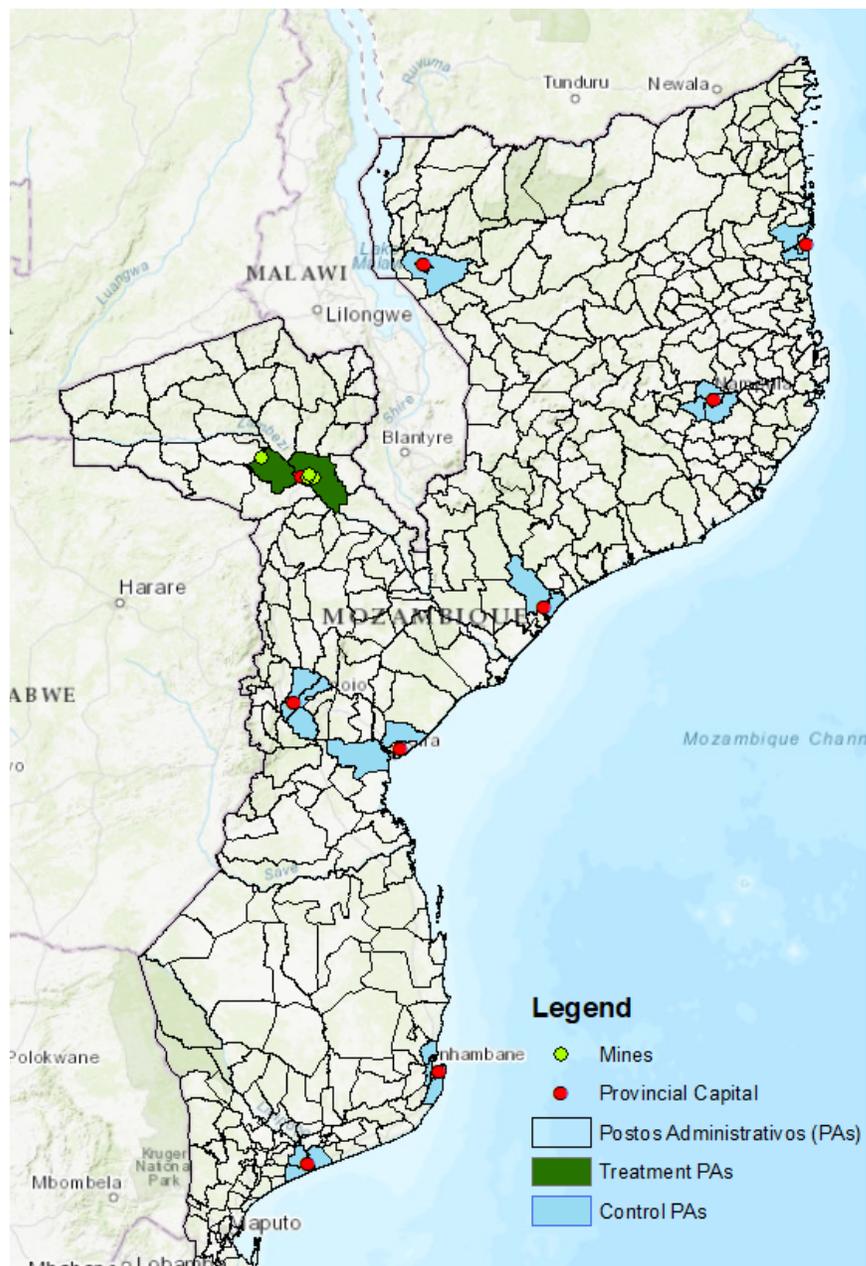
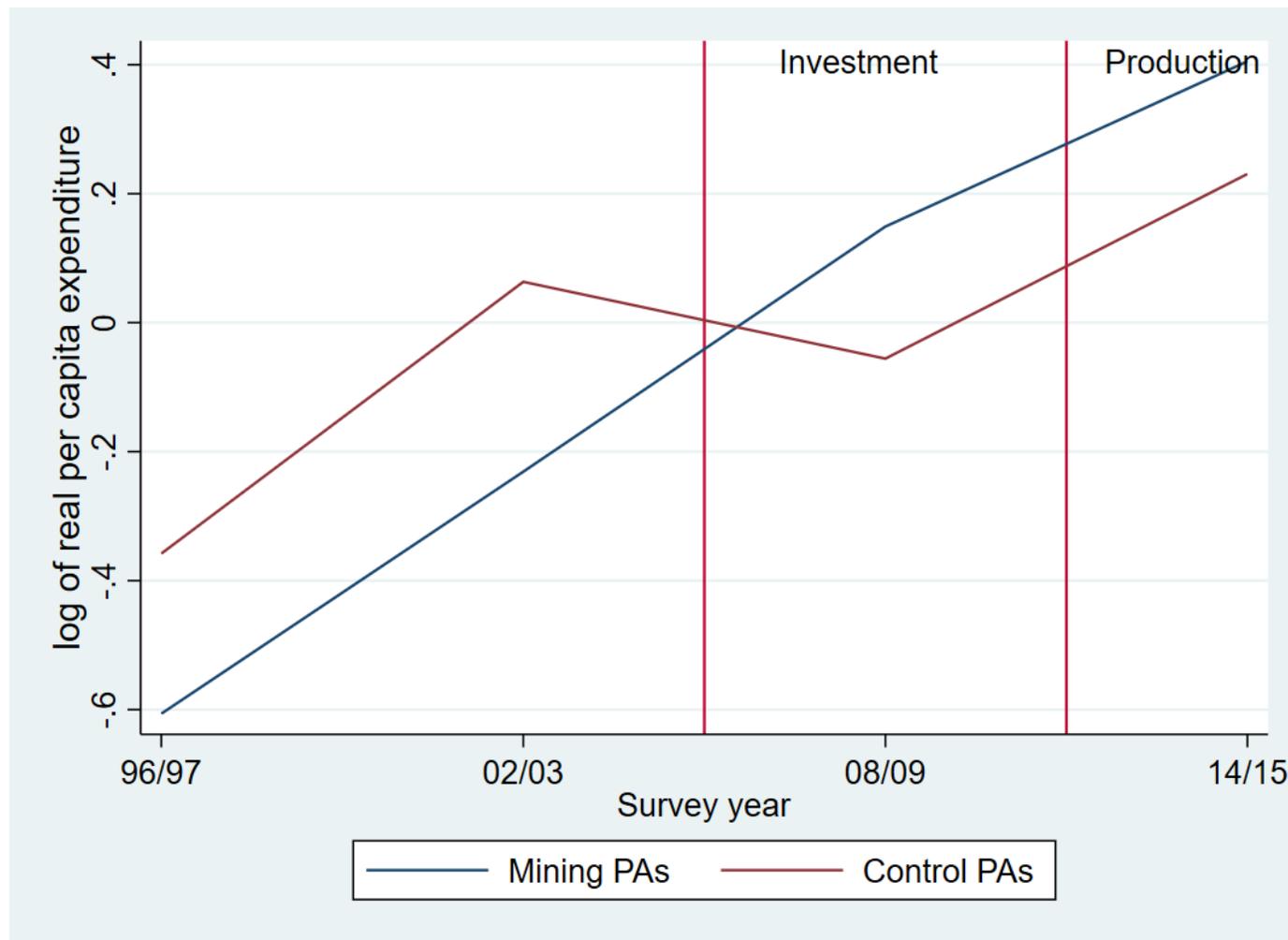


Figure 2: Trend of real daily per capita consumption in treated and control areas from 1998 to 2015.



# Results: income and poverty

	(1)	(2)	(3)	(4)
	log of per capita expenditure	Poor	Poverty gap	Poverty gap squared
Treat x Inv. period	0.444*** (0.0492)	-0.208*** (0.0375)	-21.23*** (1.718)	-15.70*** (1.163)
Treat x Prod. period	0.395*** (0.0456)	-0.116*** (0.0292)	-13.21*** (1.489)	-10.50*** (1.070)
Observations	12,608	12,608	12,608	12,608
R-Squared	0.162	0.121	0.133	0.118
Controls	Yes	Yes	Yes	Yes
Parallel trend	Yes	Yes	Yes	Yes
Pre-treatment mean of the treated	-0.231	0.624	28.755	16.734

Notes: controls include district fixed effects, year fixed effects, survey quarter fixed effects, age and education. Standard errors are robust.

# Results: structural change and labor

Variable	Phase	Total	Female	Male
Agricultural employment	Investment	0	--	0
	Production	---	--	---
Mining employment	Investment	+++	+++	0
	Production	+++	+++	0
Manufacturing	Investment	0	0	0
	Production	0	0	0
Services	Investment	++	+	0
	Production	+++	++	+++
Wage employed	Investment	0	+	0
	Production	+++	+++	0
Self-employed	Investment	0	0	0
	Production	0	--	0
Family worker	Investment	0	---	0
	Production	0	0	0
Domestic worker	Investment	+	+	0
	Production	0	0	0

# Results: infrastructure, services and health

Variable	Phase	Total	Female	Male
Walking time to water source	Investment	0	--	0
	Production	--	---	0
Walking time to market	Investment	+++	0	+++
	Production	0	--	0
Walking time to transport	Investment	0	0	0
	Production	0	0	0
Access to electricity network	Investment	+++	+++	+++
	Production	+++	+++	+++
Sick	Investment	+++	++	0
	Production	0	0	0
Seeking health service	Investment	+++	+++	++
	Production	0	0	0
Absenteeism of children	Investment	0	0	0
	Production	0	0	0
Primary education concluded	Investment	0	0	0
	Production	+++	+++	++

# Limitations and conclusion

## Conclusions:

- Positive economic effects similar to findings of local effects of gold mines in other countries.
- Stronger and larger employment mobility for women. Mining sector jobs either occupied by foreign workers or women.
- Indication of negative effect on market access during resettlement period.

## Limitations:

- Cannot follow individuals over time so we cannot identify those who had to relocate and direct effect on them.
- Next IOF from 2019/20 might allow assessing longer-term impact including fiscal effects.

# Thank you.

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