

RESOURCE ADDICTION AND THE ENERGY TRANSITION

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15th August 2021

SACHS AND WARNER (2001)

REGRESSION

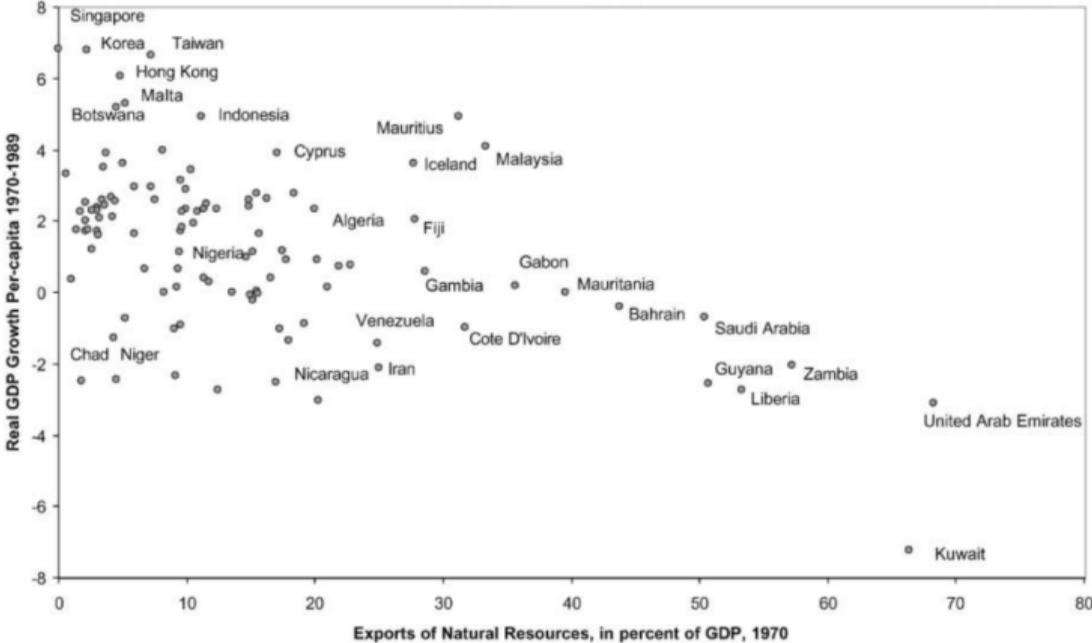
They try to evaluate the following relationship:

$$g_i = f(\text{Resources}_i / \text{GDP}_i)$$

- ▶ natural resource dependence in country i : $\text{Resources}_i / \text{GDP}_i$
- ▶ g_i growth in GDP per capita (period 1970 to 1989)

What do you expect this relationship to be?

ECONOMIC GROWTH AND RESOURCES



IDENTIFICATION

There are many reasons why this result should not be interpreted as being causal!

But this is something we would learn in class and not here today!

Result started a new literature: Resource Curse!

MEHLUM, MOENE AND TORVIK (2006)

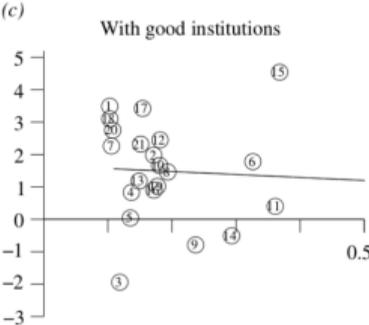
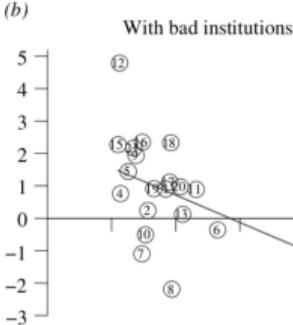
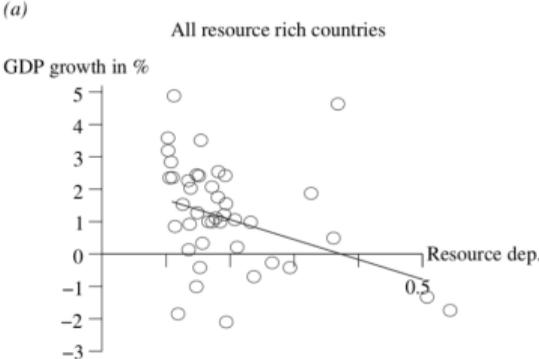
INSTITUTIONS

Institutions: rules of the game! Strong institutions are good for a country's economic performance.

Resource dependence may be associated with economic differently in "strong" and in "weak" countries.

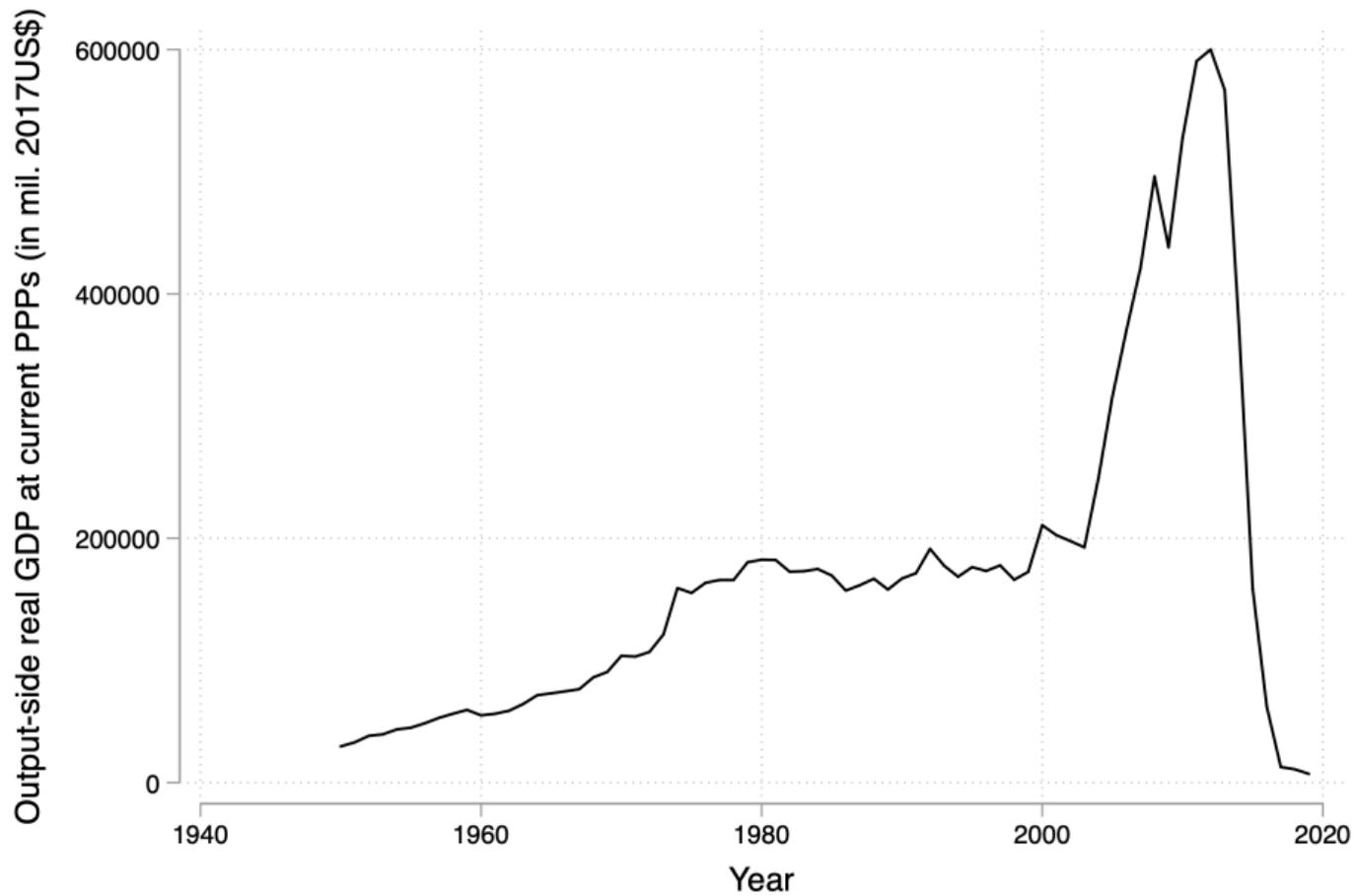
What do you expect?

RESULT



VENEZUELA

VENEZUELA



WHAT JUST HAPPENED!

What happened in Venezuela?

Economically downward spiral for years with growing political discontent (hyperinflation, power cuts and shortages of food and medicine).

HISTORY

Venezuela has THE largest oil reserves: 304 billion barrels in 2019, more than Saudi Arabia.

In the early 2000's it was also in the top 10 in terms of production and exports!

⇒ Important: according to the Atlas of Complexity in 2000 75% of the exports are generated by Oil!

ELECTION OF HUGO CHAVEZ

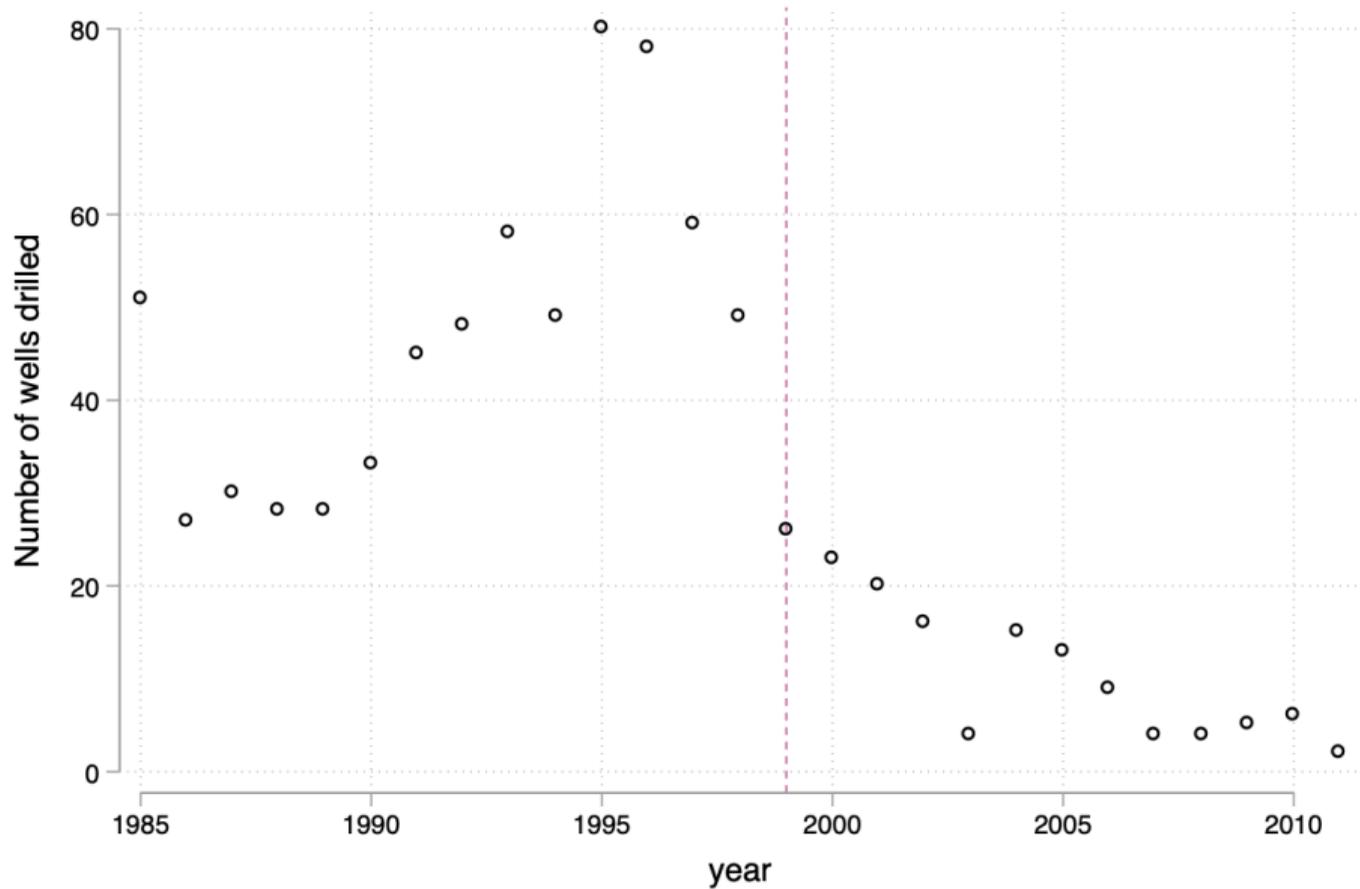
Social government under Hugo Chavez comes into power in 1999.

Under his rule PDVSA (state owned oil company of Venezuela) was treated like a piggybank, with little interest in the industry's future development.

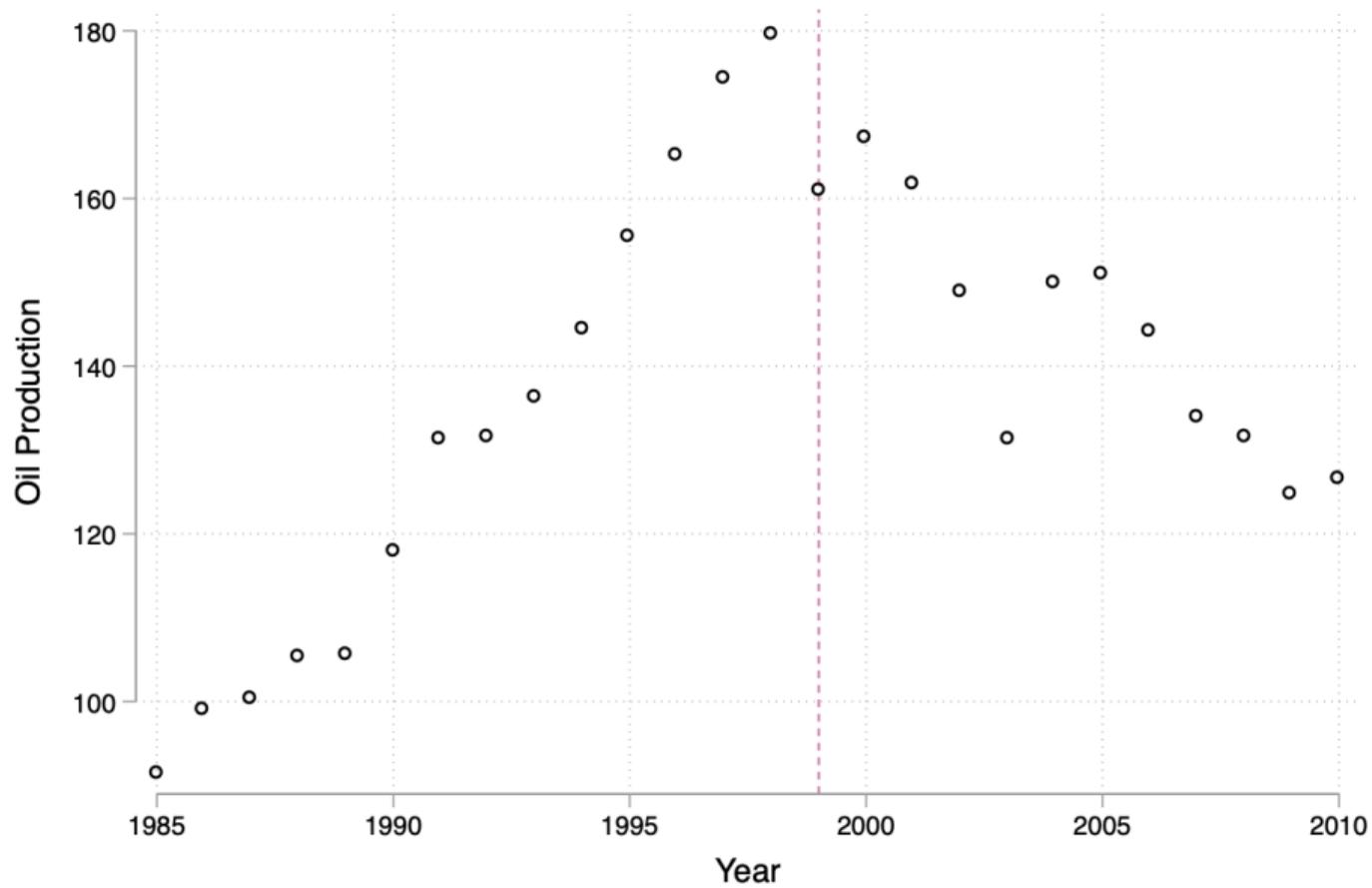
OIL COMPANIES

Firm	Min	Max
BP	1994	2011
Chevron	1996	?
ConocoPhillips	1996	2007
ENI	2001	?
ExxonMobile	1996	2007
Shell	1993	?
Total	1994	?

VENEZUELA DRILLING



VENEZUELA PRODUCTION



CURRENT SITUATION

A good case study of the resource curse!

Produces roughly 5% of Russian daily production today, because the oil sector is not functioning.

Moreover: manufacturing and agricultural sector collapsed: In 1999, there were 13,000 companies in the country. By 2016, less than a third of the companies remained in Venezuela.

CONCLUSION

This is one example on how a resource dependent country can destroy the own economy.

In this particular case the harm has been self inflicted, but if the world is going to move through an energy transition, this drop in demand will trigger the collapse of many resource dependent economies.

Let us explore a specific case study by focusing on a resource which Europe already tried to get away from: Coal!

COAL

TRANSITION FROM COAL

- ▶ Historically, Belgium, France, Germany, Poland and the UK may be considered to be coal rich.
- ▶ Belgium, France and the UK finished their transition by closing the last deep coal mine in 1993, 2004 and 2015 respectively.
- ▶ Germany and Poland still extract and use coal in their generation of electricity.

⇒ let us study the consequences of on such transition

UNITED KINGDOM

COLLAPSE IN THE UK



In December 2015 the last deep coal mine in Britain closed!

COLLAPSE

What are the the economic consequences of an industry specific collapse?

How to buffer a drop in industry specific demand?

COLLAPSE

Why the UK?

Fastest and most acrimonious deindustrialisation process in the developed world (Beatty and Fothergill, 1996; Glyn and Machin, 1997; Foden et al., 2014).

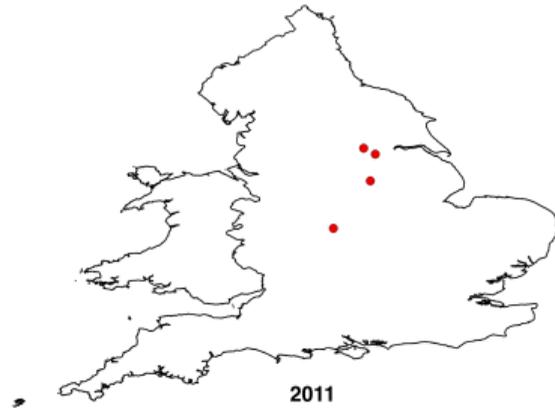
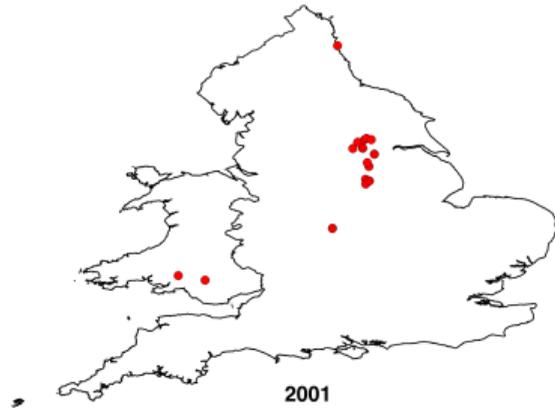
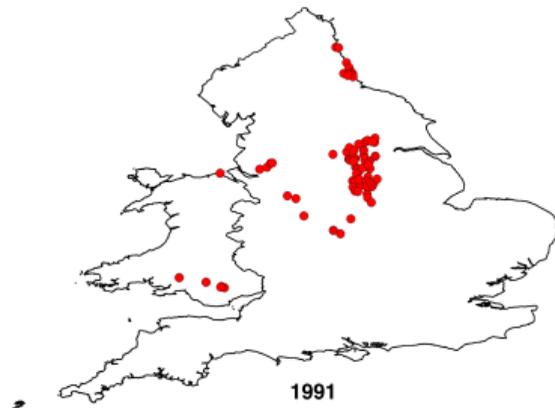
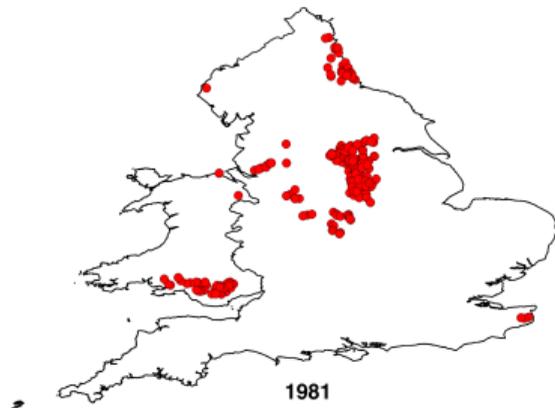
⇒ Employment fell from almost 240,000 workers in 1981 to around 60,000 in 1991.

EXPERIMENT

Ideal Experiment: Take several resource rich (local) economies and then randomly destroy the extractive industry in some.

Natural Experiment: In 1984 Margaret Thatcher famously declared war to the labour unions and within 10 years nearly completely destroyed the coal industry.

COLLAPSE



NATURAL EXPERIMENT

This experiment is ideal to answer this question for at least three reasons:

1. Large shock to local communities (e.g. up to 15% of employed labour force);
2. Affected entities are comparable across space and time;
3. We can follow the units of analysis for a long period of time.

BACKGROUND

BACKGROUND

Coal played a key role in UK's industrial revolution and subsequent economic growth (Fernihough and O'Rourke, 2014).

After WWII the coal industry started a long decline due to increased availability of cheaper substitutes.

The increase in oil prices in the early 1970s slowed down the decline in production and employment.

STRIKE IN 1984

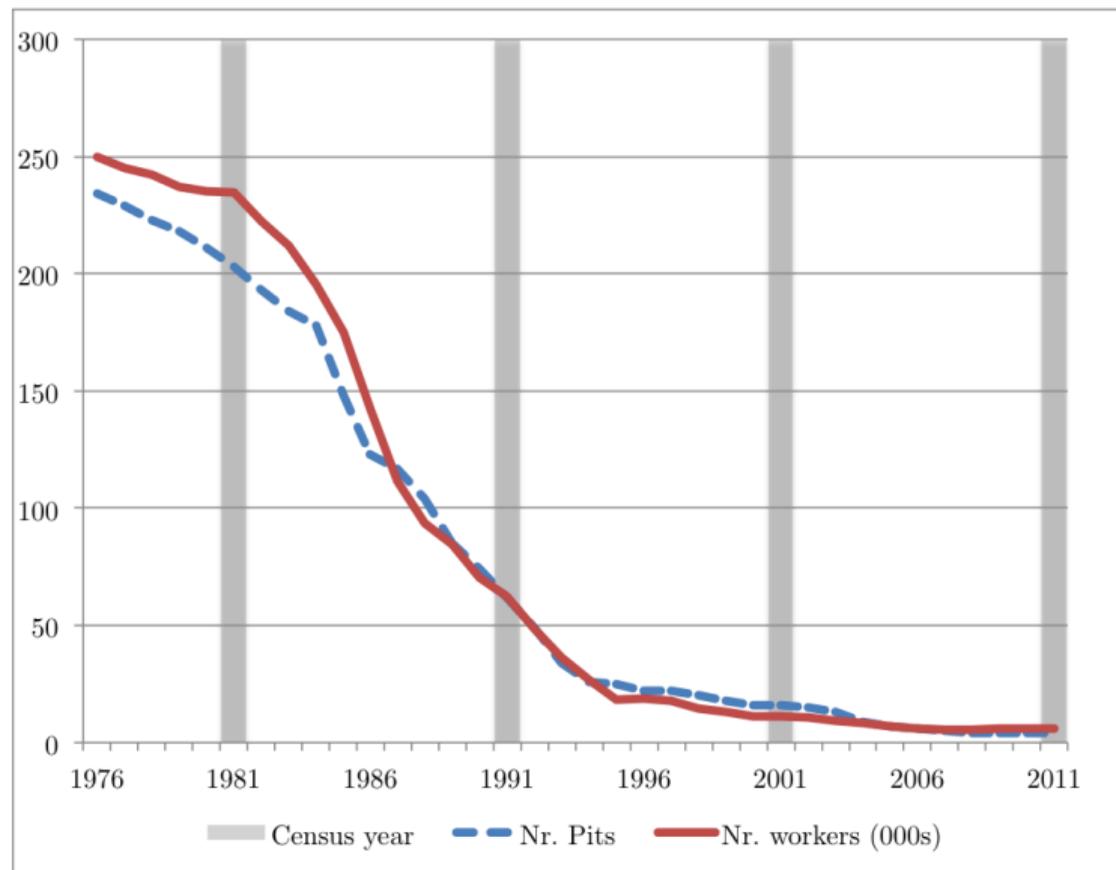
In 1984 the UK government announced the closure of 20 pits and information of the closure of 70 additional pits was leaked to the public.

→ The National Union of Mineworkers called for a general strike.

Thatcher declares war: *We had to fight the enemy without in the Falklands. We always have to be aware of the enemy within, which is much more difficult to fight and more dangerous to liberty.*

→ 30% of pits closed by 1986 and 90% by 1994.

COLLAPSE



CONSEQUENCES

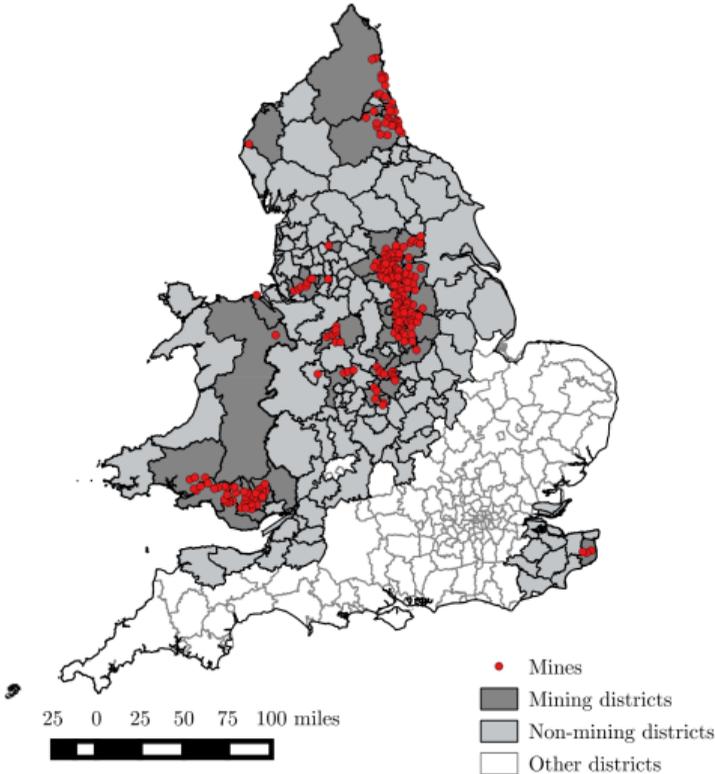
What do you expect to happen?

CONSEQUENCES

What do you expect to happen?

1. Decrease in population size and employment;
2. Decrease in wages of male and female workers;
3. decrease in other social factors;

LOCATION OF MINES



ESTIMATION

$$y_{it} = f(\text{Nr. mine closures})$$

y_{it} is a placeholder for population, unemployment, employment and wages.

Nr. mine closures $_{it}$ is the cumulative number of mines closed since 1981.

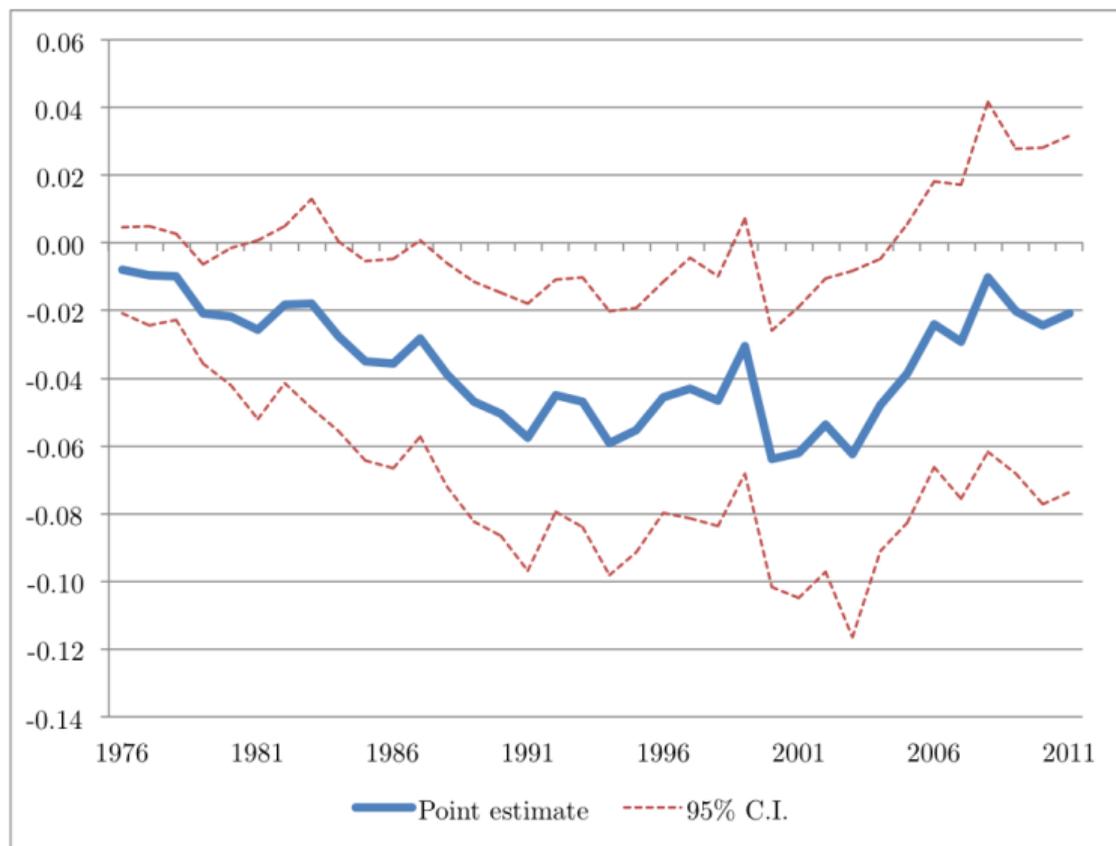
RESULTS

AGGREGATE EFFECT

	Nr. primary workers '000s (1)	ln(pop.) (2)	ln(nr. workers) (3)	Particip. rate (4)	Unemploy. rate (5)
<u>A. Men</u>					
Nr. of mines closed since 1981	-1.045*** (0.066)	-0.006** (0.002)	-0.009*** (0.003)	-0.225*** (0.074)	-0.003 (0.075)
<u>B. Women</u>					
Nr. of mines closed since 1981	-0.017 (0.015)	-0.004* (0.002)	-0.006* (0.003)	-0.178** (0.079)	-0.011 (0.047)

Notes: Robust standard errors in parentheses. Standard errors are clustered at county level. * denotes significant at 10%, ** significant at 5% and *** significant at 1%. All regressions are estimated using OLS, and include district and year fixed effects. Sample includes districts within 30 miles of a mine. Panel A reports estimates using outcomes for men, while Panel B uses outcomes for women. Primary sector includes mining plus agriculture, forestry, fishing, energy and water supply. Number of primary workers is measured in thousands. Number of observations = 696, number of districts=174.

PERSISTENCE



DEMOGRAPHICS

	% female pop.	% prime age pop.	% population with tertiary education		Children per woman	% single individ.
	(1)	(2)	Women (3)	Men (4)	(5)	(6)
Nr. mines closed since 1981	0.041*** (0.012)	-0.013 (0.058)	-0.217*** (0.059)	-0.151** (0.058)	-0.008*** (0.002)	0.229*** (0.053)

Notes: Robust standard errors in parentheses. Standard errors are clustered at county level. * denotes significant at 10%, ** significant at 5% and *** significant at 1%. All regressions are estimated using OLS, and include district and year fixed effects. Sample is the same as in baseline regression. Columns 1 and 2 use as outcomes the population share of women and prime age individuals (16-44 years old). Columns 3 and 4 use the share of population over 16 years with tertiary education. Column 6 uses the ratio of population age 0 to 15 years to women age 35-44.

NEXT STEP

ENERGY TRANSITION

What are the the economic consequences of an industry specific collapse (such as coal)?

How to buffer a drop in industry specific demand?

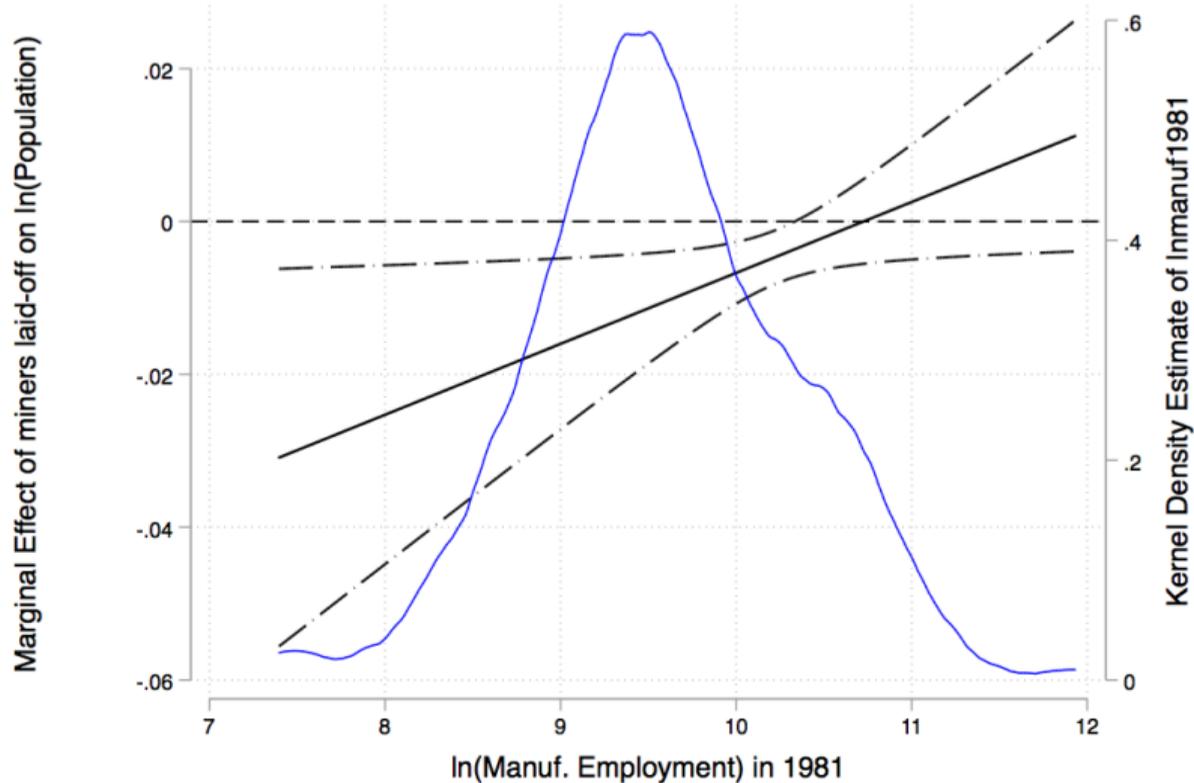
DIVERSIFICATION

Standard recommendation to resource rich economies: Don't put all your eggs in one basket!

Large and diverse manufacturing sector allows to hedge against ups and downs in other sectors.

We have seen before that people move away from the affected regions. How would you expect the outflow of people to be affected by mine closure IF it is in a location with a large manufacturing sector?

MARGINAL EFFECT



CONCLUSION

What did we learn?

- ▶ Large negative economic consequences which are long lasting.
- ▶ A large tradable sector buffers the negative consequences of a negative shock !

Has anybody succeed in this approach to diversify?

DIVERSIFICATION

EXAMPLE

The potential for diversification is affected by many factors, including the resource base, the capacities of the population and the quality of economic management.

Not many examples of developing countries that have built diversified economies from initial conditions of strong concentration in mineral sectors: Malaysia, Thailand, Chile, Indonesia and Sri Lanka.

I have picked Malaysia....because similarly to Russia it has a diversified resource endowment.¹

¹Check Gelb(2010) if you are interested in the other economies.

MALAYSIA

It made massive investments in land development to expand and modernize the production of rubber and palm oil.

It also made heavy investments infrastructure, especially in the areas of energy, communications and transport.

Malaysia did start out on a protectionist path in the 1960s, in 1973-74 it shifted to an extensive export promotion drive based on cheap manufactures.

MALAYSIA

In the mid 1980s, strategy shifted towards higher-technology products and skills upgrading.

Investments and targeted support were provided through a variety of programs, aimed at reducing production costs and increasing competitiveness.

MALAYSIA

