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The (hard) coal phase out.

Experience from Germany

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Motivation

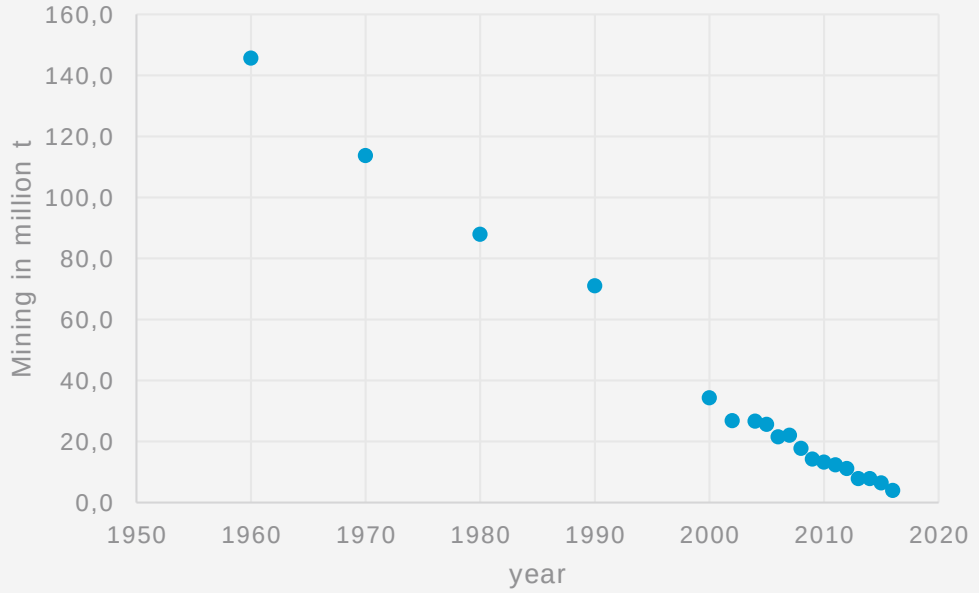
- Meeting the climate goals requires a phase out from fossil fuels especially coal.
- Most governments are reluctant to take action into this direction.
- (At least) 2 reasons

1. Electricity generation relies heavily on coal fired power plants. (not today's topic)
2. Many regions rely heavily on the economic 'benefits' (Jobs, Income…) of mining coal. (todays topic)

- What are the economic effects that we might expect from refraining from mining coal?

The Situation in Germany

- During the 1950s and 1960s Germany used to have a large hard coal mining industry, especially located in the very western part of (then) West-Germany.



- Coal mining in Germany is expensive (due to underground mining).
- During the 1960s, competition from oversea coal imports (Australia, South-Africa and South America) pushed German coal out of the market.
- Due to the economic importance of coal mining:

1. which was more or less highly concentrated in the Ruhrarea with 4500 sqKm which is half the size of the Metropole region of Melbourne
2. and around 400000 employees at that time

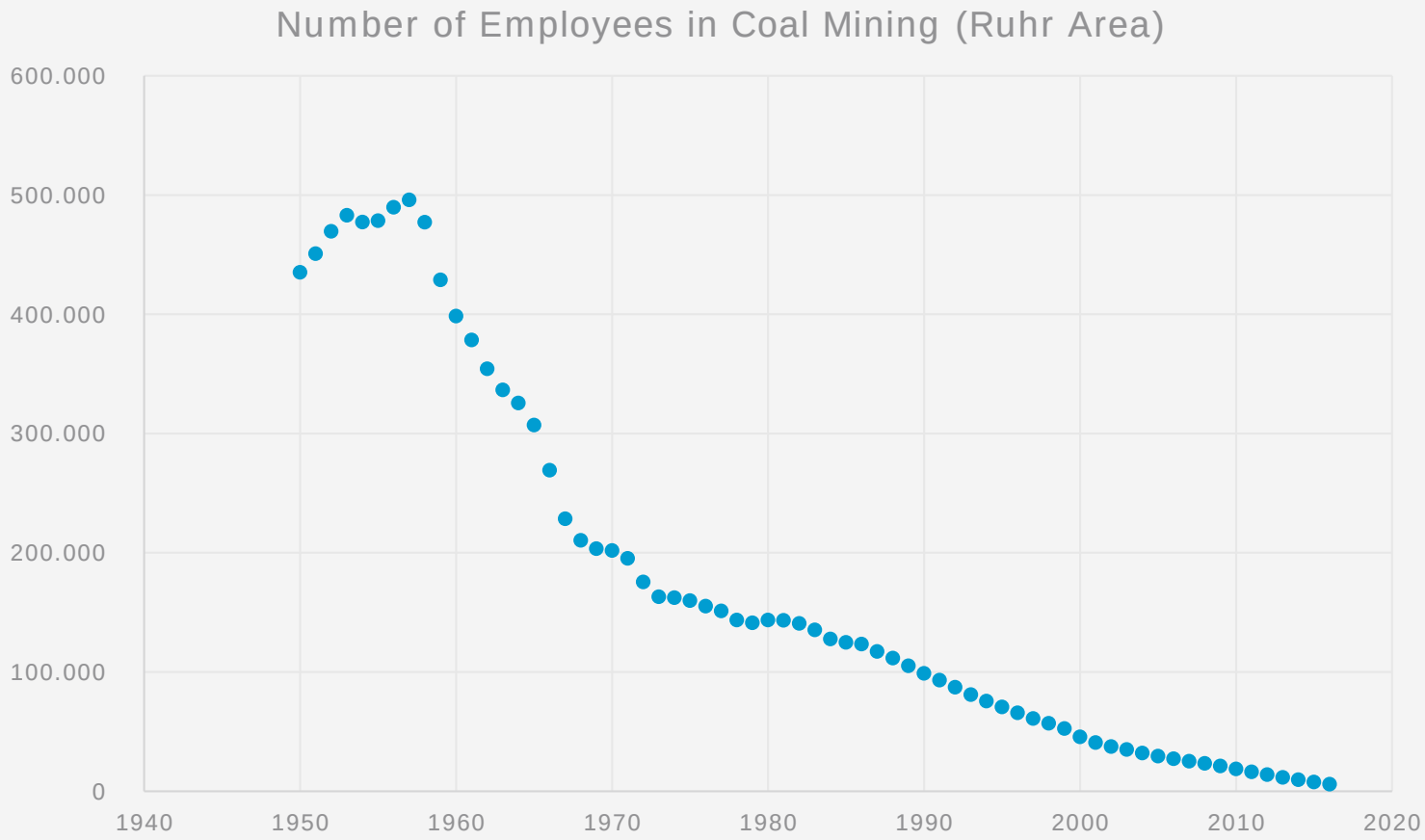
- there was an urge for (economic) policy to act.

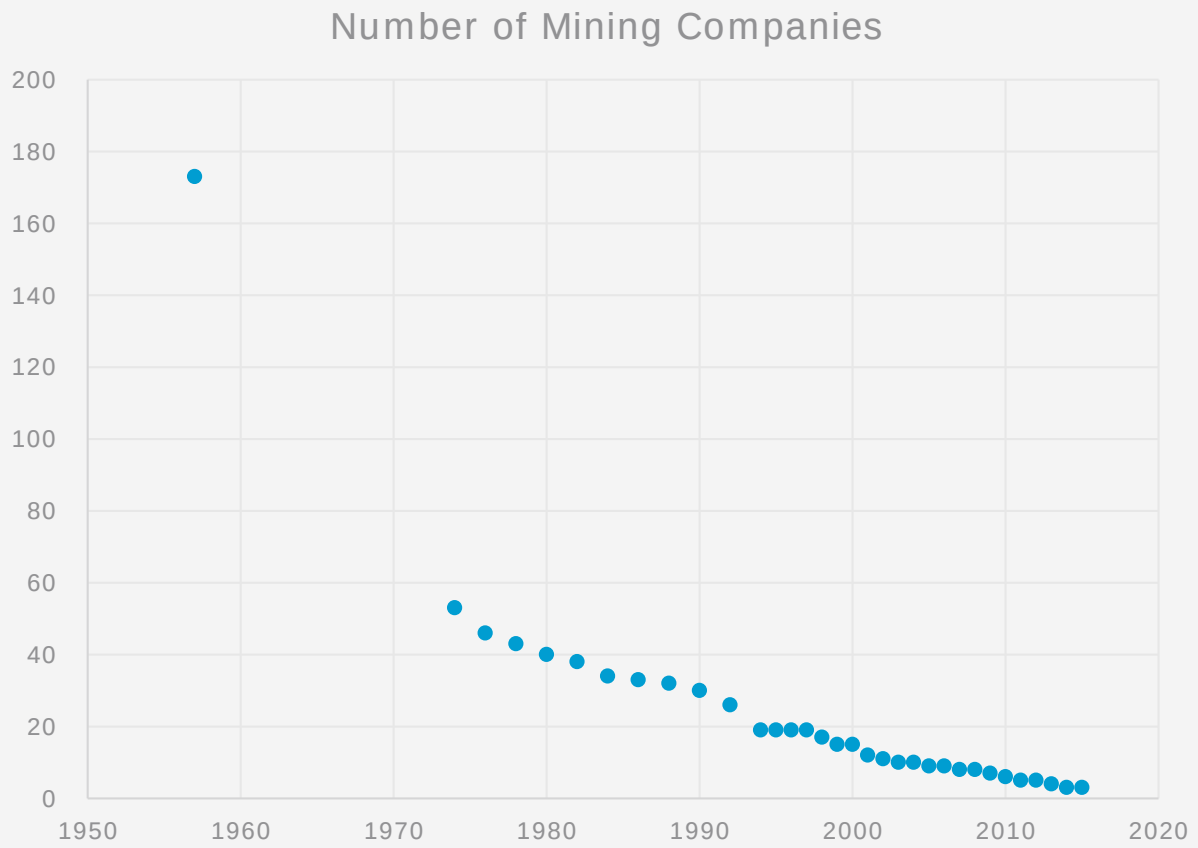
Subsidizing Coal

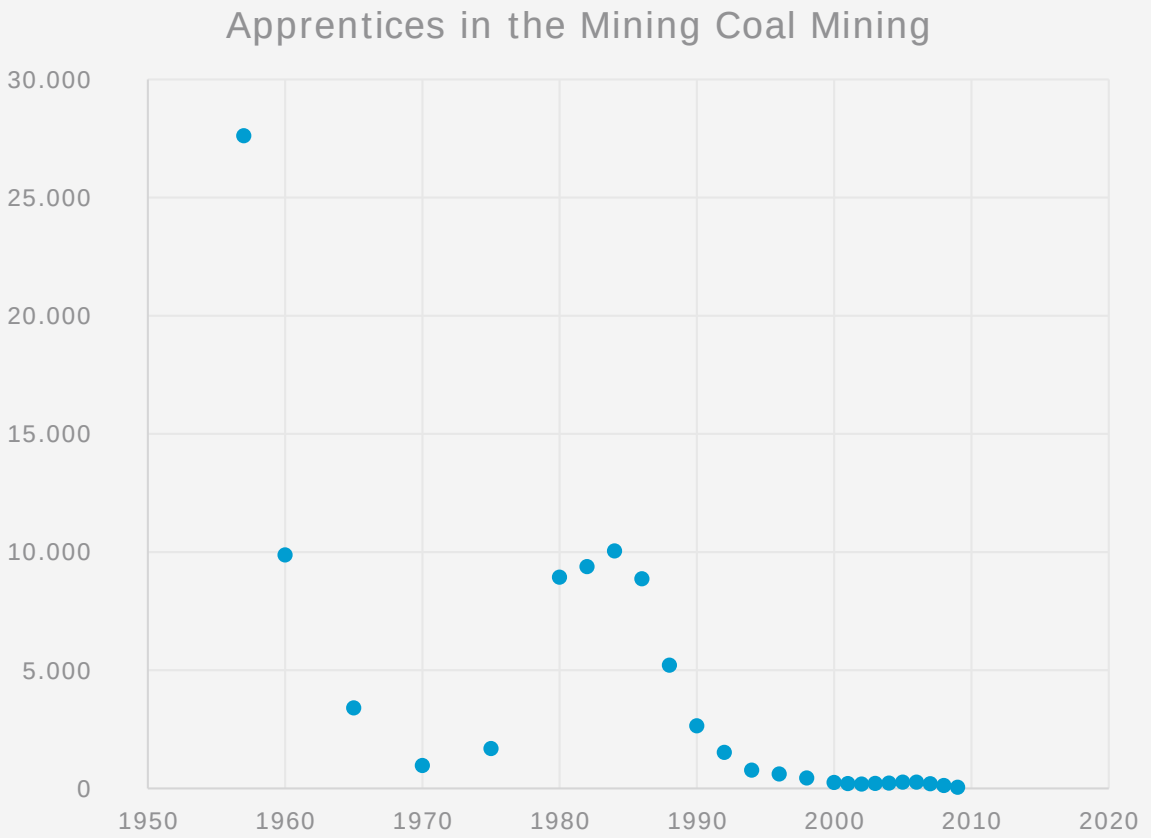
- In order to keep the German coal industry in the market, the government implemented a huge subsidy scheme to support mining companies.
- Consumers had to pay a higher price for electricity (up to 8%).
- This money was then used to subsidy (indirectly) German coal mining by incentivizing coal fired power plants to buy German coal.

Subsidizing Coal

- The volume of this programme (between 1975 and 2002 alone) was 100 billion Euro (in 2002) prices.
- The coal subsidy throughout the years ranks second of all federal subsidies that the German Government pays.
- In 2016 it was 1,2 Billion Euros (plus roughly the same amount from the regional government).
- Because all consumers faced the increase in the electricity price, this subsidy resulted also in a large re-allocation of resources between the regional governments (the Bundeslander).


Number of Employees in Coal Mining (Ruhr Area)
600.000
500.000
400.000
300.000
200.000
100.000
0
1940
1950
1960
1970
1980
1990
2000
2010
2020


Number of Mining Companies
200
180
160
140
120
100
80
60
40
20
0
1950
1960
1970
1980
1990
2000
2010
2020


Apprentices in the Mining Coal Mining
30.000
25.000
20.000
15.000
10.000
5.000
0
1950
1960
1970
1980
1990
2000
2010
2020

Structural Facts of Mining Industry

- The number of employers declined since the 1960s
- The number of mining companies decreased (with a steep decrease in the 1960s due to the closing down of small scale mines).
- Same is true for the number of apprentices in mining, however it peaked in the mid 1980s (subsidy effect?)
- Although program stops in 2018, there are apprentices still in 2009 (these guys are 16-19 years when starting apprenticeship)

Structural Change

- What we here observe is an event study of the decline of the mining industry (buffered by a federal subsidies program).
- What we want to know in a first step is how the formerly employed coal miners are affected by this structural change.
- Do they find new jobs easily?
- Do they face (long?) periods of unemployment?
- What is the wage/income effect?

The Data

- The majority of employees in Germany are subject to the social security system consisting of health insurance, unemployment insurance and a pay-as-you-go pension system.
- With a job paying more than 450 Euro per month and employer has to become part of the unemployment insurance system.
- If the employee becomes part of the system of unemployment insurance all relevant data is being collect by the unemployment agency.
- This data is very reliable, because it forms the basis for example for the payment in case of unemployment.

The Data

- The relevant data that the unemployment agency collects is
  - the beginning and the end of an employment/unemployment spell
  - the daily wage during that spell
  - demographic information: age, sex education
  - occupation
  - regional and sectoral information
- Most recent version is from 1975-2010 (in 2% random sample that can be used as scientific use file)

The Data

- The data consist of 1.5 mio spells, i.e. situation in which a person is in one specific state.
- The number of persons varies between 300000 and 600000 (remember that one person can have many spells over its employment career)
- Using the entire data set is (in general) possible, but only on-site in Nuremberg.

Identification

- Using the data, we are able to identify those individuals working in the hard coal mining industry (due to detailed sectoral information).
- Moreover, we can also identify ‘mining workers’ in this industry and employees that work for example in administration.
- Eventually, from this group of employees we need to identify those that are affected by structural change, i.e. by closing down a specific mine.
- We can then analyse what happens with these individuals.

Identification

- There are two ways to identify individuals that are affected by the closing down of a coal mine:

1. We have very detailed information when and where a mine has been closed down. Using this regional information we could identify those individuals that are of interest.
2. The unemployment agency offers an algorithm which can identify mass layoffs in a region. Using this algorithm, we construct an index that identifies individuals that are affected by a mass layoff in the hard coal mining industry.

- Using this information, we follow those individuals through their occupational history.

Findings: Employment (all based on the subsample)

- Number of employees in the coal mining industry that are affected by a mass layoff: 1421
- Number of employees that are identified after the event of the layoff: 1339
- 1421-1339=82 individuals do no longer participate in the labour market.
- Only 49 (3.5%) experience an unemployment spell after the layoff.
- Thus the majority of laid-off workers finds a new job instantaneously after the lay-off.

Findings: Employment (all based on the subsample)

- 60% of the laid off individuals are ‘real’ blue collar coal miners.
- From those workers who find a job, 58% remain to be ‘real’ blue collar coal miners.
- Thus, the lay-off is in general not associated with some kind of retraining or occupational change.
- This is also reflected in the fact that 85% of employers stay in the same industry (the coal mining industry)
- Thus the phase out is neither associated with a occupational nor with a sectoral change.

Findings: Wages (all based on the subsample)

- To analyse wage effects of the coal phase out, we compare the (daily) wage of individuals in the spell before lay-off with the (daily) wage in the **first** new employment spell.
- We focus on full-time employees.
- Average wage **increases** by around 3%.
- The wage distribution however is affected very asymmetrically (median is 2%)
- Long ‘left-tail’: more wage decreases/small increases

Findings: Wages (all based on the subsample)

- For individuals that change their occupation we find that wages increase by 7%.
- For individuals that do not change their occupation we find wage increases of around 4.5%.
- Large variance due to the small number of observations.
- Might be driven by self-selection effects.

Findings: Wages (all based on the subsample)

- For individuals that change the sector (i.e. do not work in the coal mining industry after their layoff) we find that wages **decrease** by 4.5%.
- Individuals that remain within the same sector experience wage increases of 8%.
- Again large variance due to the small number of observations
- Loss of specific skills, but also selection effects might be part of the story.

Somewhat puzzling findings

- Coal phase out had only minor employment effects and even sometimes positive wage effects.
- Explanation is the massive subsidy programme by the German government.
- Puzzling is the fact that the former coal mining regions perform worse than any other (western region) by nearly any metric:

1. Highest per capita budget deficit
2. Highest unemployment rate (13%-15%; compare south-west-industrial core around 1.5%)
3. Lowest educational achievement (high-school drop out rate between 7%-10%)

What is next?

- Due to the large subsidy scheme, the incumbent work force does not seem to be affected too much by the phase out.
- Still, there are strong and significant economic consequences.
- Individuals entering the labour market in that region during the time of phase seem to carry the burden.
- We know from the literature that entering the labour market during a recession has severe and long lasting effects (wages, health, mortaility…)

What is next?

- We would like to identify those individuals that were at risk graduating/entering the labour market during times of mass layoff in the coal industry.
- Document the (un)employment spells of these individuals and compare this to (statistically) similar individuals from different regions in Germany.
- This would quantify individual costs of a phase out.
- Estimate regional ‘spill-over ‘ effects of a phase out.

Summing up

- Germany has experienced a phase out from (hard) coal production.
- Employment decrease from 200000 to zero within nearly 50 years.
- Marginal effects on incumbent workers (large subsidy programme)
- Further research tries to identify effects on individuals entering the labour market.