

Supply-side climate policies for the international steam coal market: Can they curb coal consumption?

This presentation is based on two research articles currently under review in Climatic Change:

Richter, Philipp M., Roman Mendelevitch, and Frank Jotzo. "Coal Taxes as Supply-Side Climate Policy: A Rationale for Major Exporters?" (<u>link to WP</u>)

Mendelevitch, Roman. "Testing Supply-Side Climate Policies for the Global Steam Coal Market – Can They Curb Coal Consumption?" (<u>link to WP</u>)

Modell results are obtained with COALMOD-World (see <u>Data Doc</u> for a detailed model description)



Motivation and Intro



Demand-side vs. supply-side fossil fuel policies

- What currently favors demand-side policies
 - Less opposition with promoting new industries e.g. renewables energies, that with closing old ones
 - GHG accounting at the national level
 - Capturing of climate rents at the demand-side
- Why supply-side policies are good complements
 - Might be less prone to leakage, depending on demand-side vs. supply-side elasticity
 - Could deal with "green paradox" if properly designed (target high-cost supply)
 - Outcomes are easier to predict, and transaction costs my be lower, due to lower number of actors
 - Prevent stranded assets and lock-in effects
 - Scarcity rents can offset lost profits (Eisenack, Edenhofer, and Kalkuhl 2012; Kalkuhl and Brecha 2013; Asheim 2013)
 - No need for overall compensation, only compensation payments between producers to alleviate internal distributional effects (Asheim 2013)



Currently proposed supply-side climate policies

- A coalition purchases and retires high-cost coal deposits (Harstad, 2012)
- Sequential closure of the entire coal industry (compensated via ring-fenced cap-and-trade scheme for fossil fuel extraction) (Collier and Venables, 2014)
- Export-licensing regime for coal (Martin, 2014)
- A coalition of major coal exporters levies a tax on the energy content of steam coal exports (Richter et al., in review)
- Fuel subsidy reform (Schwanitz et al., 2014; Burniaux and Chateau, 2014)
- Moratorium on new coal mines (Australia Institute, Denniss, 2015)



Selected Supply-Side Climate Policies for the International Steam Coal Market

Coal taxes

Supply-side policy: coal tax

	Supply-side tax scenarios					
Tax setter	Australia	AUS+ZAF+IDN+COL	exporters grand coal.		prod. grand	WEO 450ppm (implemented as
Typ of tax	prod. tax	prod. tax	export tax	prod. tax	coal.	demand-side policy)
Avg. emis. red. [GtCO ₂ /a]*	0.1	0.4	1.2	2.6	6.6	3.4
Red. in exports [%]*	4	22.4	74.9	55.1	50.1	30.8
Red. in global consump. [%]*	0.4	3.0	8.7	28.5	52.3	27.3
Avg. price change [%]*	1.5	6.4	15.8	34.4	111.6	-17.0
Optimal tax level [USD/tCO ₂]	8.8	12.2	42.6	26.0	40.5	-
Avg. welfare gain for tax setters [USD/tCO ₂]**	2.9	5.0	10.6	12.5	9.2	-
*where applicable value are given for the tax revenue maximizing tax level						

** Welfare is defined here as the sum of producer surplus, consumer surplus and tax revenue

- Consumption pattern consistent with a 2° target cannot be achieve via an export tax, only, nor by a production tax levied by a coalition of coal exporting countries
- Only a global regime of taxing CO₂ from steam coal undercuts the required level
- Supply-side policies lead to strong price increase, while with demand-side policies prices decrease by on average 17%



Selected Supply-Side Climate Policies for the International Steam Coal Market

Subsidy Reform



Findings from literature on coal subsidies

- G20 (2009), APEC (2010), Friends of Fossil Fuel Subsidy Reform (GSI 2011), UN Secretary General's High-Level Panel on Global Sustainability (2012), UN Sustainable Development Goals (2015)
- range and magnitude of fossil fuel subsidies
 - OECD 2015: total 160-200 bnUSD annually , coal subsidies 12 bnUSD.
 - Ecofys 2014: 10 bnEUR coal subsidies in the EU-28, in 2012
 - IMF (Coady et al., 2015) 2,530 bn USD coal subsidies (globally)
- Effects on production subsidy removal in literature
 - Anderson and McKibbin (2000) CGE framework C-Cubed: 5%-8% global average emission reduction
 - Fulton et al. (2015) supply-demand partial equilibrium framework: removing subsidies for U.S Powder River Basin reduces annual emissions by 21-55 MtCO₂ per year

Resource Economics

Complex definition of LEA idies GSI IMF Consumer fo ssil-fuel subsidies Producer fos al-fuel subsidies

rossil fuels exempt from social cost of externalities (non-internalized externalities).

Fossil fuels taxed below regional or international tax levels.

Fossil fuels exempt from VAT, GST, and carbon taxes.

Fossil fuel sold below cost of production, imports and international benchmark price to consumers.

Government tax and regulation levels below regional or international levels.

Government revenue foregone (reduced an exempt tax rates).

Direct transfers or potential direct transfers of funds to producers

Income or price support (above market rate prices for producers).

Source: IEA, WB, OECD, IMF and GSI, 2014 and Gerasimchuk et al. 2012, adapted from Merrill 2014, and Bridle, 2014

"The term "subsidy" can be visualized as a nesting doll at the center of the definition are ideas that everyone agrees on, but as the definition expands to include other layers, it becomes more complicated and more controversial.

Resource Economics

Supply-side policy: production subsidy removal has negligible effect on emissions



Markets reaction

 Price effect: 1% average increase compared to business -as-usual

Emissions reductions:

 82 MtCO₂/a (equal to emissions from 15-16 large in coal-fired power plants)

Subsidy definition based on Gerasimchuk et al. 2012



Selected Supply-Side Climate Policies for the International Steam Coal Market

Moratorium on new coal mines



Coal reserves vs. reserves in operating mines





Moratorium on new coal mines



High reserves: 208Gt with 85Gt in China and 48 Gt in India

- 33% price increase
- Very strong reduction in seaborne trade

Low reserves: 135Gt with 41Gt in China and 20Gt in India

- Still not all reserves are mined
- 93% price increase relative to WEO NPS
- Seaborne trade concentrates on China and India



Main findings

- Supply-side policies do not provide a one-fits-all solution to curb coal consumption
- Removing producer subsidies can come with co-benefits of additional government funds but does not substantially reduce coal consumption
- A moratorium on new coal mines can be an important step to restrict future consumption but may be not enough . Moreover, it favors incumbents raises equity concerns
- Coal export/production taxes come with co-benefits of additional government funds but global coverage is required to achieve 2°C consistent consumption path



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Findings from literature on coal production subsidies

(ปร)		Total subsidies to	Subsidy per unit of	
oment (I		coal production in	production and by	
Develop	Country	2013/14 [bn USD]	region [USD/t]	Comments
ainable	USA	2.1	Powder River Basin 3.4	Forgone profits due to preferential tax treatment
for Sust			Appalachia 1.1	account for 50%
stitute 1			others 1.0	
tional In	China	4.4	Shanxi, Shaanxi, Inner	Direct payments and investments, and the
Interna			Mongolia 1.3	provision of services below market value account
and			others 0.9	for 54%, and 39%, respectively.
	India	0.8	all 0.9	Investment by SOE Coal India Limited



Findings from literature on coal production subsidies

	Total subsidies to coal	Subsidy per unit of	
	production in 2013/14	production and by region	
Country	[bn USD]	[USD/t]	Comments
Australia	1.0	New South Wales 2.5	Lax treatment of rehabilitation liabilities constitutes
		Queensland 2.1	major subsidy
		others 1.8	
South Africa	0.04	transport to export	Rail transport subsidy, below market value sales to
		terminal 0.5	preferential consumers already disregarded in base case
			data
Indonesia	0.9	all 1.8	Policies targeting to remove subsidies are not enforced
Russia	0.07	0.4	Extreme divergence between sources on subsidy levels
Poland	0.01	0.1	Free energy supply for mine workers