

Can we reduce carbon emissions through supply mechanisms?



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Hypothesis and Background

- Many in the United States are opposed to the idea of carbon taxes and emission targets – that's too European!
- They also want to expand drilling for non-coal energy resources, especially natural gas and oil.
- One theory is that the U.S. can still achieve emissions reductions without carbon taxes if it expands its supply of cleaner, non-coal energy resources.
- What happens if U.S. coal production becomes less productive?

Carbon dioxide emissions from firms' usage of domestic product/

Purchases of domestic energy input for use by sector (CO2DF/VDFA)

Energy inputs	<i>Two representative sectors</i>	
	Agriculture	Other industries and services
2 Coal	2.2%	2.0%
3 Oil	0.0%	0.3%
4 Gas	0.5%	0.5%
5 Oil_pcts	0.2%	0.2%
6 Electricity	0.0%	0.0%



T Boone Pickens is talking about windmills, but he's dreaming of natural gas.

Reminder of original experiment

- Four industrialized regions set emissions targets, with endogenous carbon tax rates.
- No trade of emissions in this scenario.
 - i.e. carbon taxes must drive emissions reductions.
- Emission reductions occur. For the United States, a heavy reliance on coal and relatively modest emissions reduction targets resulted in an easy emissions reduction compared to other regions (for example, Japan).

Region	Overall emissions m tonnes	Emissions reduction %	Real carbon tax required \$
USA	1649.1	-17*	67.74
EU27	1079.2	-17*	90.04
EEFSU	649.5	1.56	0
JPN	298.8	-30*	248.21
RoA1	284.4	-40*	275.96
EEx	883.2	1.63	0
CHN	1199.7	0.42	0
IND	288.8	0.74	0
ROW	712.3	1.53	0

* Indicates that this was set in stone by the shock to the exogenous gco2q variable.

U.S. non-coal supply boom!

- Good news for the USA! As the result of a variety of events coinciding with the election of T-Boone Pickens for President --- removal of pesky government regulations, drilling in the Arctic, increased access to natural gas reserves under shale, and improved production technologies --- non-coal energy production has increased by roughly 10 to 40 %!
 - But we're not paying taxes on carbon. Any kind of emissions reduction is a perk. Those Europeans can do what they want.

Region	notr	Where productive use of natural resources by non-coal energy sectors increase by...				notr	Where productive use of natural resources by non-coal energy sectors increase by...			
		0% (base)	10%	20%	40%		0% (base)	10%	20%	40%
		<i>Emissions change %</i>					<i>Real carbon tax per region</i>			
USA	-17	0.68	1.19	1.61	2.28	67.74	0	0	0	0
EU27	-17	-17	-17	-17	-17	90.04	87.83	88.45	89.01	89.97
EEFSU	1.56	1.27	1.35	1.42	1.53	0	0	0	0	0
JPN	-30	-30	-30	-30	-30	248.21	243.96	245.23	246.39	248.43
RoA1	-40	-40	-40	-40	-40	275.96	272.4	272.87	273.37	274.38
EEx	1.63	1.17	1.3	1.41	1.61	0	0	0	0	0
CHN	0.42	0.33	0.34	0.35	0.36	0	0	0	0	0
IND	0.74	0.55	0.58	0.61	0.66	0	0	0	0	0
ROW	1.53	1.16	1.26	1.35	1.5	0	0	0	0	0

- Well, unfortunately the sign is positive. U.S. carbon emissions actually increased as a result of higher domestic production of cleaner fuel types.
- Interestingly, the U.S. refusal to institute a carbon tax resulted in lower carbon taxes necessary for other Annex 1 countries to meet their targets.

Welfare impacts of non-coal supply boom

- U.S. tot in 40% scenario driven by high domestic prices of other industrial goods and services
- This is in turn driven by increase in the price of the energy-capital nest.

Where productive use of natural resources by non-coal energy sectors increase by...

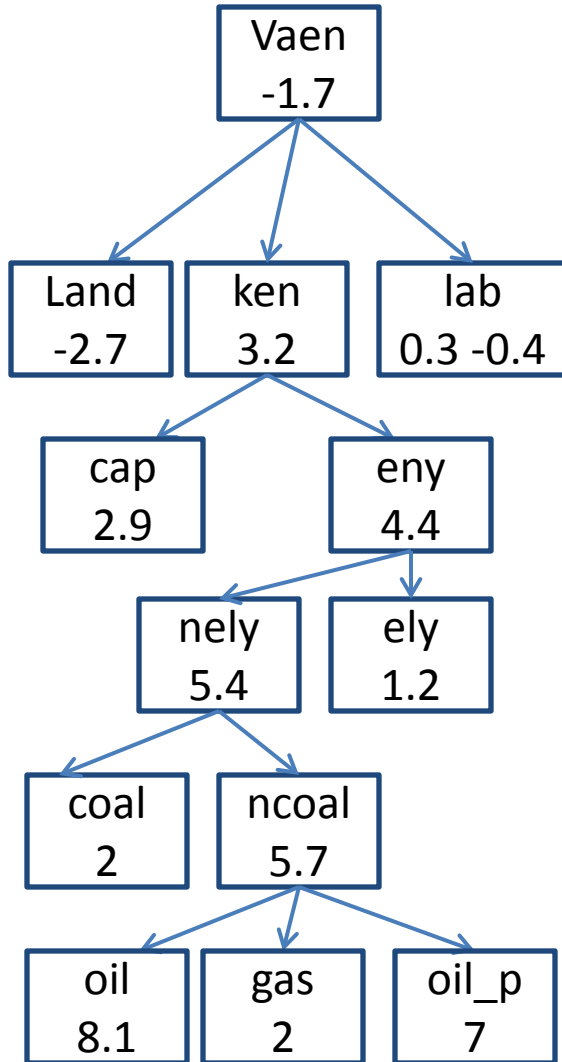
region	0% scenario		40% scenario	
	u	tot	u	tot
	USA	0.03	0.13	0.19
EU27	-0.16	0.13	-0.12	0.18
EEFSU	-0.73	-0.81	-1.02	-1.18
JPN	-0.43	0.76	-0.41	0.93
RoA1	-0.99	0.03	-1.05	-0.15
EEx	-0.39	-0.96	-0.63	-1.52
CHN	-0.01	0.01	0.01	0.11
IND	0.15	0.3	0.26	0.58
ROW	0.07	0.06	0.11	0.14

What would be the better way to reduce the use of coal in the US?

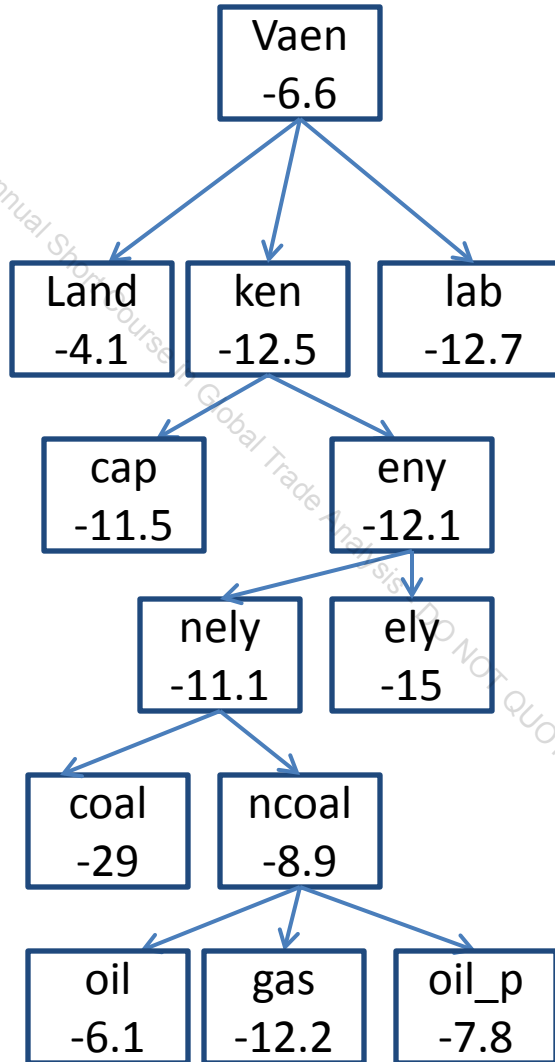
- Make natural resource less available for coal production
- Tax on use of coal
- Increase coal augmenting productivity

	Base		Limiting natural resource use in the coal sector		10% tax on coal use		10% coal augmenting productivity increase	
	emission	u	emission	u	emission	u	emission	u
USA	0.68	0.03	0.5	0.02	-1.00	0.03	-0.6	0.068
EU27	-17	-0.16	-17	-0.16	-17	-0.15	-17	-0.155
EEFSU	1.27	-0.73	1.27	-0.73	1.28	-0.73	1.26	-0.728
JPN	-30	-0.43	-30	-0.43	-30	-0.43	-30	-0.432
RoA1	-40	-0.99	-40	-0.99	-40	-0.99	-40	-0.986
EEx	1.17	-0.39	1.17	-0.39	1.17	-0.39	1.16	-0.391
CHN	0.33	-0.01	0.33	-0.01	0.34	-0.01	0.33	-0.012
IND	0.55	0.15	0.54	0.15	0.55	0.15	0.56	0.151
ROW	1.16	0.07	1.15	0.07	1.16	0.07	1.15	0.068

Limiting natural resource use



10% tax on coal use



10% coal augmenting productivity increase

