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Domestic Oil & Gas Policy

Prof. Richard Sweeney

ECON3391.01, Boston College

It's Not Just High Oil Prices. It's a Full-Blown Energy Crisis.

By Helen Thompson · The New York Times · 7 min

[View Original](#)



It's not just international politics that are being shaped by the sustainability of present energy consumption. Domestic politics are being shaken up, too.

By damning oil companies that aren't ramping up production, Mr. Biden has decided to privilege the voters desperate for lower immediate prices over the Democrats who insist the climate crisis should remain the priority. For the European Union, the fact that European consumers are filling Moscow's war coffers has forced unpalatable ethical issues to the surface. As the prime minister of Italy, Mario Draghi, asked Italians: "Do you prefer peace or the air conditioning on?"

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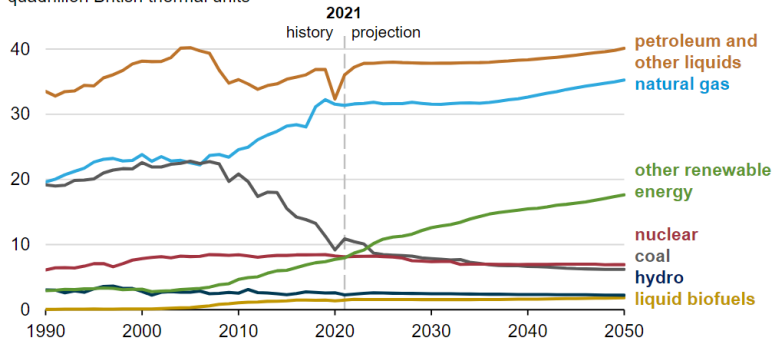
Jones Act

- Brief background on oil and gas trends
- Fracking
 - Costs: Muehlenbachs, Spiller, and Timmins (2015)
 - Benefits: Muehlegger & Sweeney (2022)
- Hydrocarbon infrastructure details
- Policy debates:
 - Oil export ban
 - Keystone XL pipeline
 - Jones Act

Background

Energy consumption by fuel, AEO2022 Reference case (1990–2050)

quadrillion British thermal units



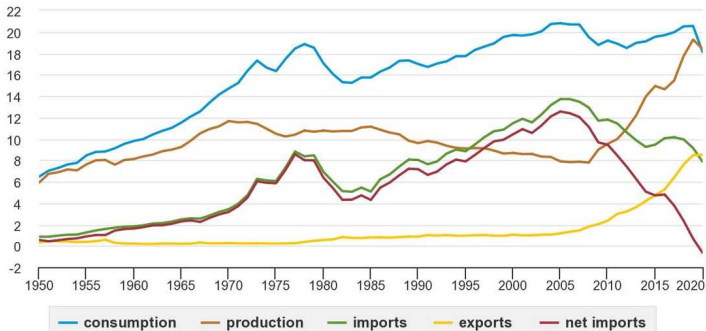
Source: U.S. Energy Information Administration, *Annual Energy Outlook 2022* (AEO2022)

Note: Biofuels are both shown separately and are included in petroleum and other liquids.

In our *Annual Energy Outlook 2022* (AEO2022) Reference case, we project that U.S. energy consumption will grow through 2050, primarily driven by population and economic growth. In this case, which reflects only current laws and regulations, renewable energy is the fastest-growing energy source through 2050, and petroleum remains the largest share of energy consumption throughout that period, followed by natural gas.

U.S. petroleum consumption, production, imports, exports, and net imports, 1950-2020

million barrels per day



Source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 3.1, March 2021, preliminary data for 2020

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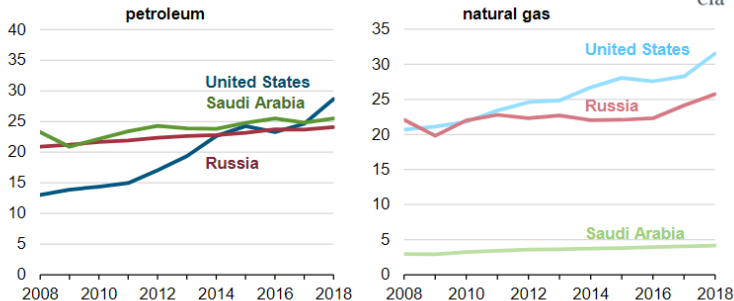
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Estimated petroleum and natural gas production in selected countries

quadrillion British thermal units



Source: U.S. Energy Information Administration, based on International Energy Statistics

Note: Petroleum includes crude oil, condensate, and natural gas plant liquids.

Fracking

What is hydraulic fracturing?

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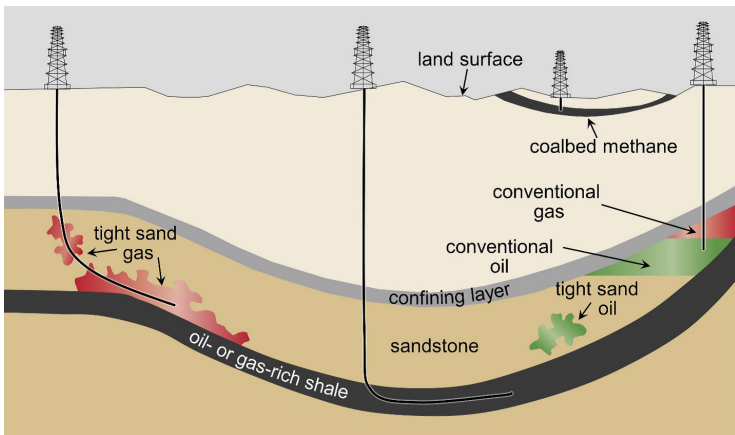
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What is hydraulic fracturing?

- Technique for increasing oil and gas yields
- “Fracking” involves injecting high pressure fluids to break up rock formations
- The fluid generally consists of
 - water
 - chemicals
 - proppant (sand/ synthetic beads that hold open fractures)
- Hydraulic fracturing has been used for decades.

Recent boom due to the combination with horizontal drilling

- Allowed for economical extraction from coalbeds, shale and tight formations



Source: EPA (2015)

Fracking involves many negative externalities

What are they?

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Fracking is one of the most contentious issues in energy policy

President Trump: “The shale energy revolution will unleash massive wealth for America.... I think probably no other business has been [more] affected by regulation than [fracking]”

President Biden placed a moratorium on federal drilling on day one.

Many places have banned fracking outright (CA, MD, NY, UK). Several Democratic candidate platforms pledged to ban fracking across US.

Fracking is one of the most contentious issues in energy policy

President Trump: “The shale energy revolution will unleash massive wealth for America.... I think probably no other business has been [more] affected by regulation than [fracking]”

President Biden placed a moratorium on federal drilling on day one.

Many places have banned fracking outright (CA, MD, NY, UK). Several Democratic candidate platforms pledged to ban fracking across US.

Our goal: use data to quantify the **costs** and **benefits** of fracking to inform sensible debate.

MST

Discussion of Muehlenbachs, Spiller, and Timmins (2015)

“The Housing Market Impacts of Shale Gas Development”

What is the research question?

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What is the research question?

- What is the "impact" of shale gas development

What is the research question?

- What is the "impact" of shale gas development
- More specifically: Impact of X on house prices:
 - "visibility" (-)
 - Threat of water contamination (-)
 - Local economy (+)

The drilling process is inherently destructive

- Have to bring in large trucks, heavy equipment
- Often have to build gathering pipelines
- Can fragment landscape and have long lasting impacts on habitat



Most media coverage has focused on the water impacts of fracking

- For example, The New York Times “Drilling Down” series
- Fracking uses significant amounts of water and generates large amounts of waste water
 - this wastewater needs to be disposed of and treated properly
- Groundwater depletion
- Groundwater contamination
 - either leaking well casings or seepage from surface storage pits
 - wellbores often traverse drinking-water aquifers

This paper attempts to quantify these costs using house price data

Goal is to get an estimate of people's true **willingness to pay** (in \$)
using **revealed preference**

ie they want to make a statement like: "The average person in
Pennsylvania would be willing to pay / accept \$X to allow / remove
a fracked well near their home."

Using house prices to infer preferences for environmental amenities

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- How much do people value a good? For normal goods the answer is easy: Look at the price (estimate demand)
 - Example: childcare

Using house prices to infer preferences for environmental amenities

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- How much do people value a good? For normal goods the answer is easy: Look at the price (estimate demand)
 - Example: childcare
- Environmental externalities are inefficiently supplied because there is **no price**. That also makes them difficult to value.
- MST use **hedonic property method** to solve this problem.
 - Access to safe reliable drinking water is an important home attribute
 - If people know the impact of fracking on water quality, changes in home prices should reflect their willingness to pay for clean water
- Extra challenge in this setting: Economic activity from drilling could also increase local property values
 - Landowners receive up to thousands of dollars in (unobserved) bonus payments and 12.5-21% royalty payments per unit of gas extracted

How does the research question relate to the existing literature?

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- Scientific studies on how much the landscape is changing, drinking water tests, etc.
- Some great reporting on some affected people/ communities, but little large scale evidence
- Some surveys and opinion polls about how people feel
- Also unclear how to translate those studies into \$'s
- A couple econometric papers have also looked at house prices

How does the research question relate to the existing literature?

- Scientific studies on how much the landscape is changing, drinking water tests, etc.
- Some great reporting on some affected people/ communities, but little large scale evidence
 - *Anecdotes are important for generating questions, but often suggest testable implications if widespread*
- Some surveys and opinion polls about how people feel
 - *Economists generally prefer revealed preference.*
- Also unclear how to translate those studies into \$'s
 - *Why is it important to get these in dollars?*
- A couple econometric papers have also looked at house prices
 - *"A major obstacle to accurately estimating the impact of shale gas development on surrounding homes is the presence of correlated unobservables"*

What is the data used in the paper? How was it collected?

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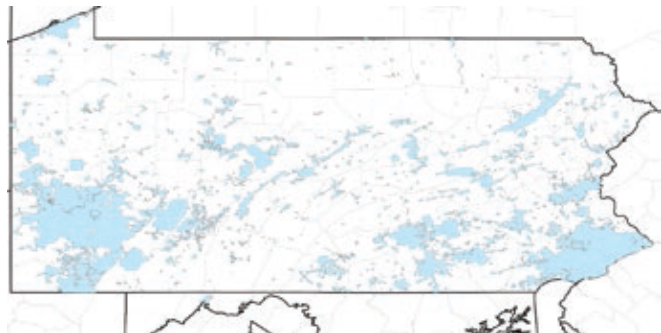
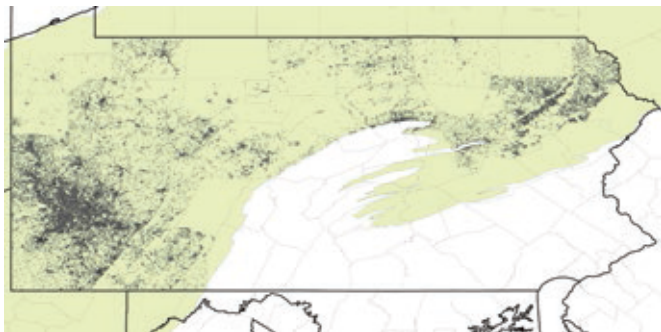
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What is the data used in the paper? How was it collected?

- Transaction records of all PA properties sold 1995-2012 (Corelogic)
- Drilling locations and dates from PADEP
 - data contain 6,260 wellbores which MST group into 3,167 well pads
- Also observed quantity produced from each well
- Use GIS Viewshed tool to predict how many wells are within eyesight of each property



Summary of the key variables

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TABLE 1—SUMMARY STATISTICS BY SAMPLE

	Full sample		Boundary subsample	
	Mean	SD	Mean	SD
Transaction price (k 2012 dollars)	134	(98.4)	120	(92.1)
Age of house	55.7	(32.1)	61.3	(34.9)
Total living area (1,000 sq ft)	1.59	(0.67)	1.54	(0.634)
No. bathrooms	1.82	(0.852)	1.68	(0.799)
No. bedrooms	2.96	(0.933)	2.91	(0.984)
Lot size (acres)	0.578	(3.9)	0.53	(4.5)
Distance to nearest MSA (km)	22.3	(12.4)	26.4	(13.4)
Groundwater dependent	0.0771	(0.267)	0.0563	(0.231)
Distance to closest well pad (km)	11.7	(5.35)	11.2	(5.5)
Pads in 1 km	0.00329	(0.081)	0.00596	(0.113)
Pads in 1.5 km	0.00855	(0.164)	0.015	(0.226)
Pads in 2 km	0.0178	(0.289)	0.0314	(0.401)
Pads in 20 km	4.73	(18.1)	5.11	(21)
Pads in view in 1 km	0.000474	(0.024)	0.000844	(0.0325)
Pads in view in 1.5 km	0.00113	(0.0425)	0.0022	(0.0599)
Pads in view in 2 km	0.00189	(0.0671)	0.00368	(0.0955)
Producing pads in 1 km	0.00263	(0.0736)	0.0049	(0.104)
Producing pads in 1.5 km	0.00694	(0.152)	0.0127	(0.214)
Producing pads in 2 km	0.0147	(0.274)	0.0273	(0.388)
Observations	229,946		66,327	

Notes: Samples are the same as those used in our main estimation (i.e., only include properties that were sold more than once during the sample period). The boundary subsample includes only properties in the narrow band on either side of the border of the public water service area.

What is a unit of observation in this paper?

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What is a unit of observation in this paper?

Home - sale.

Main sample restricts to homes that sell multiple times.

Empirical challenge: wells are not located randomly

$$\text{Price}_{it} = \alpha \text{Shale Well}_{it} + X_{it}\beta + \epsilon_{it}$$

The willingness to allow drilling may be correlated with other attributes that affect housing values (X)

- What are some of these things?
- What direction do you think the bias from omitting some x would be?
 - Has to effect the outcome ($\beta_x \neq 0$)
 - Has to be correlated with **Shale Well**

Empirical challenge: wells are not located randomly

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What is their strategy for dealing with this?

Empirical challenge: wells are not located randomly

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What is their strategy for dealing with this?

- **difference in differences:** MST attempt to overcome this by looking at how the same property's price changes over time as drilling expands around it

Impact categories

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- Adjacency effects - costs and benefits of being near a well independent of water impacts
 - costs: noise, air pollution, visual disruptions, etc
 - benefits: lease and royalty payments
- Groundwater contamination risk (GWCR)
 - some properties rely on groundwater, others use publicly treated water
- Vicinity effects - general costs and benefits in a wider (e.g. 20 km) area
 - costs: traffic, accidents, etc
 - benefits: increased employment, spending, public finances, etc

MST identification strategy

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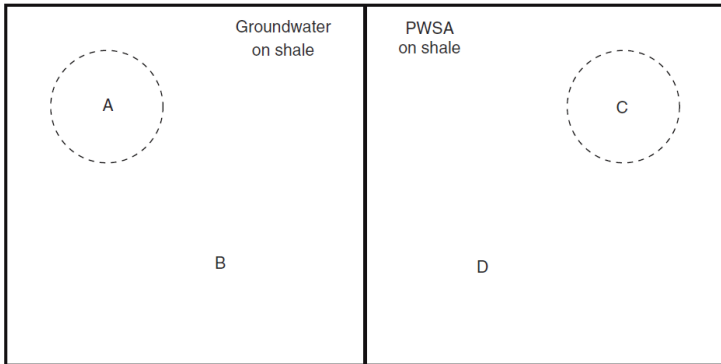
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Figure: Types of Areas Examined



- circles represent adjacency effect buffers
- rectangles distinguish areas that rely on groundwater for drinking

Empirical strategy

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- Comparing change in property value before and after fracking generates different price changes by property type:

$$\Delta P_A = \Delta Adjacency + \Delta GWCR + \Delta Vicinity_{GW} + \Delta Macro$$

$$\Delta P_B = \Delta Vicinity_{GW} + \Delta Macro$$

$$\Delta P_C = \Delta Adjacency + \Delta Vicinity_{PWSA} + \Delta Macro$$

$$\Delta P_D = \Delta Vicinity_{PWSA} + \Delta Macro,$$

- Groundwater effect identified using triple difference-in-differences estimator:

$$\Delta GWCR_{DDD} = [\Delta P_A - \Delta P_B] - [\Delta P_C - \Delta P_D]$$

Visualizing the results

Good empirical papers will illustrate their empirical strategy and results graphically before diving into the econometrics.

In this case, simply plot the residuals of house price within an area, in a year, as a function of distance to a well.

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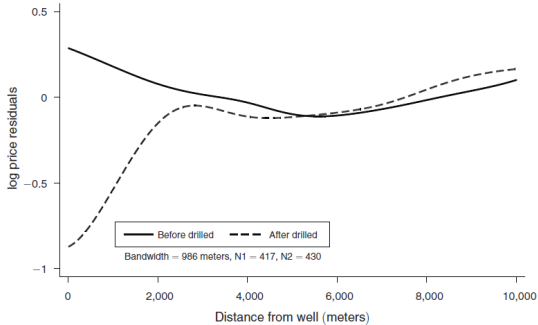
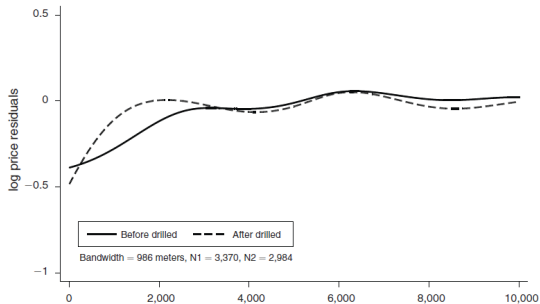
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Gradient for PWSA (top) vs groundwater areas



MST Results: Groundwater impacts

TABLE 2—LOG SALE PRICE ON WELL PADS

	$K \leq 1$ km		$K \leq 1.5$ km		$K \leq 2$ km	
	Full (1)	Boundary (2)	Full (3)	Boundary (4)	Full (5)	Boundary (6)
<i>Panel A. County-year fixed effects</i>						
Pads in K km	0.028 (0.025)	0.026 (0.035)	0.029** (0.014)	0.034* (0.02)	0.016** (6.9e-03)	0.018* (0.01)
(Pads in K km) × GW	-0.062 (0.046)	-0.165** (0.072)	-0.042* (0.025)	-0.099*** (0.036)	-0.023 (0.02)	-0.013 (0.052)
Pads in 20 km	-7.8e-04*** (3.0e-04)	-8.1e-04 (5.3e-04)	-8.3e-04*** (3.0e-04)	-9.3e-04* (5.5e-04)	-8.4e-04*** (3.0e-04)	-9.4e-04* (5.6e-04)
(Pads in 20 km) × GW	6.6e-04 (4.7e-04)	2.0e-03*** (7.0e-04)	7.0e-04 (4.9e-04)	2.0e-03*** (6.8e-04)	7.1e-04 (5.2e-04)	1.7e-03** (6.8e-04)
Property effects	Yes	Yes	Yes	Yes	Yes	Yes
County-year effects	Yes	Yes	Yes	Yes	Yes	Yes
Quarter effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	229,946	66,327	229,946	66,327	229,946	66,327
p -value ($\alpha_3 + \alpha_4 = 0$)	0.414	0.051	0.544	0.090	0.740	0.919
Avg. pads in K km	0.003	0.006	0.009	0.015	0.018	0.031
Avg. pads in 20 km	4.725	5.108	4.725	5.108	4.725	5.108

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TABLE 3—ADJACENCY EFFECTS

	$K = 1$ km (1) ln(price)	$K = 1.5$ km (2) ln(price)	$K = 2$ km (3) ln(price)
<i>Panel A. log sale price on well pads in view</i>			
Visible well pads in K km	1.1e-03 (0.072)	-0.019 (0.058)	0.019 (0.035)
Not-visible well pads in K km	0.03 (0.028)	0.036*** (0.013)	0.015** (6.5e-03)
Pads in 20 km	-6.0e-04* (3.3e-04)	-6.4e-04* (3.3e-04)	-6.5e-04* (3.3e-04)
<i>Panel B. log sale price on productive wells</i>			
Unproductive pads in K km	-0.052 (0.077)	-0.043 (0.035)	-0.054* (0.03)
Producing pads in K km	0.044** (0.02)	0.038*** (0.013)	0.02*** (5.8e-03)
Pads in 20 km	-6.0e-04* (3.3e-04)	-6.4e-04* (3.3e-04)	-6.3e-04* (3.3e-04)
<i>Panel C. log sale price on timing of wellbores</i>			
Old bores (drilled > 365 days) in K km	0.021 (0.018)	0.023** (9.8e-03)	0.011** (4.4e-03)
New bores (drilled \leq 365 days) in K km	-4.4e-03 (0.029)	-9.7e-03 (0.013)	-3.3e-04 (8.0e-03)
Old undrilled permits (> 365 days) in K km	0.055** (0.025)	0.022 (0.014)	0.011 (0.012)
New undrilled permits (\leq 365 days) in K km	0.04* (0.023)	7.2e-03 (0.014)	7.2e-03 (7.9e-03)
Pads in 20 km	-6.0e-04* (3.3e-04)	-6.2e-04* (3.3e-04)	-6.3e-04* (3.3e-04)
Property effects	Yes	Yes	Yes
County-year effects	Yes	Yes	Yes
Quarter effects	Yes	Yes	Yes
Observations	212,207	212,207	212,207

Results Summary

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- Estimate risk of groundwater contamination negatively affects house values within 1-1.5 km of a fracked well in PA
- Find that households that rely on piped water actually benefited from being near wells
 - results appear to be driven by royalty payments
 - positive finding is explained by wells that were drilled over a year prior to the sale (after drilling costs)
 - Only find these positive effects for wells that are not visible from the property
- Average annual loss for groundwater dependent homes within 1.5 km of a well is \$30,167
- This is larger than the average annual gain for piped water properties within 1.5 km of a well of \$4,802

What do you think of the empirical results in this paper?

Are they convincing? Any concerns?

What do you think of the empirical results in this paper?

Are they convincing? Any concerns?

- why do some houses lease?
- hedonic regression like this only measures the *perceived* impact of a disamenity.

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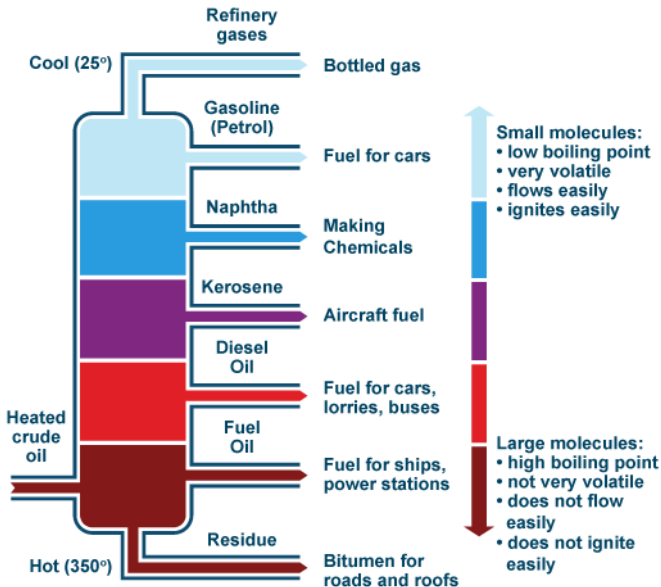
What questions does this paper leave unanswered? How might you answer them?

Supply chain

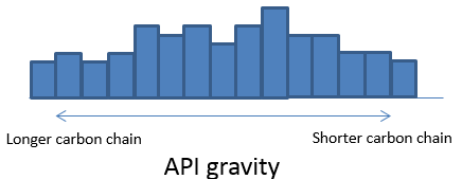
Who benefited from the shale boom?

- It's clear the domestic *production* has increased dramatically, and that imports have declined.
- But politically the biggest concern is gasoline *prices*. Have those declined?
- Answer requires understanding the petroleum supply chain
 - not all crudes are the same
 - not all refineries are the same
 - pipelines are a key constraint
- Muehlegger & Sweeney (2022) use these details to estimate the incidence of oil price shocks
- Policy question: Keystone XL
- Jones Act

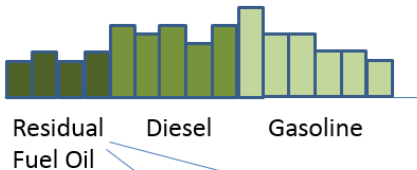
Crude oil is a combination of different length hydrocarbons



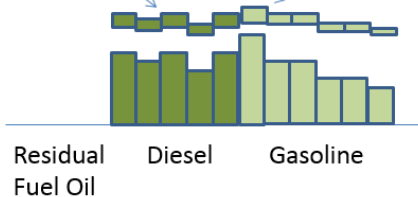
Overview of refining



Simple Distillation



Cracking

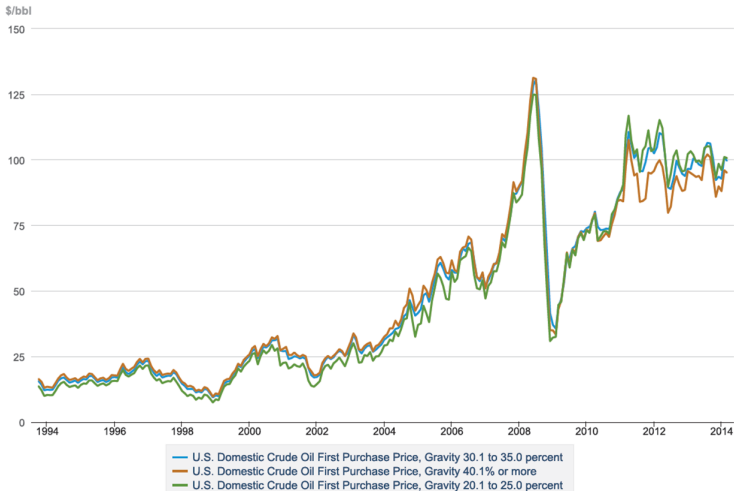


Not all crudes are equal

- Crude oil defined by two characteristics: sulfur content and density
- High sulfur “sour” crude is harder to process
 - sulfur corrodes and has to be removed
- Dense “heavy” crudes contain smaller shares of valuable end products like gasoline
 - need more sophisticated equipment to refine
- When you hear oil price quotes on the news, it’s typically for a high value “light sweet” crude like West Texas Intermediate
- Like any other commodity, prices can vary by space if shipping is costly and / or there are transportation constraints

Heavy crudes typically trade at a discount to lighter crudes

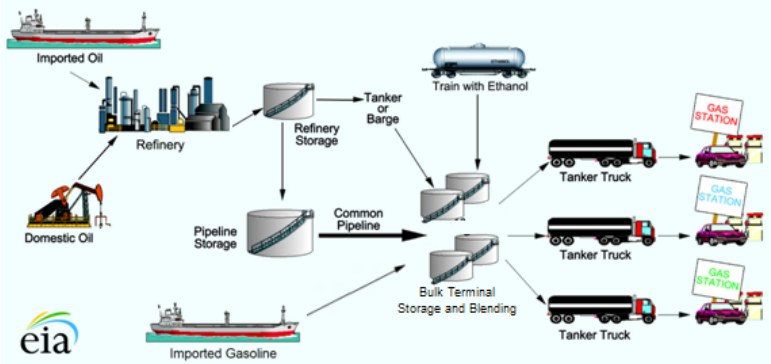
Domestic Crude Oil First Purchase Prices by API Gravity




Source: U.S. Energy Information Administration

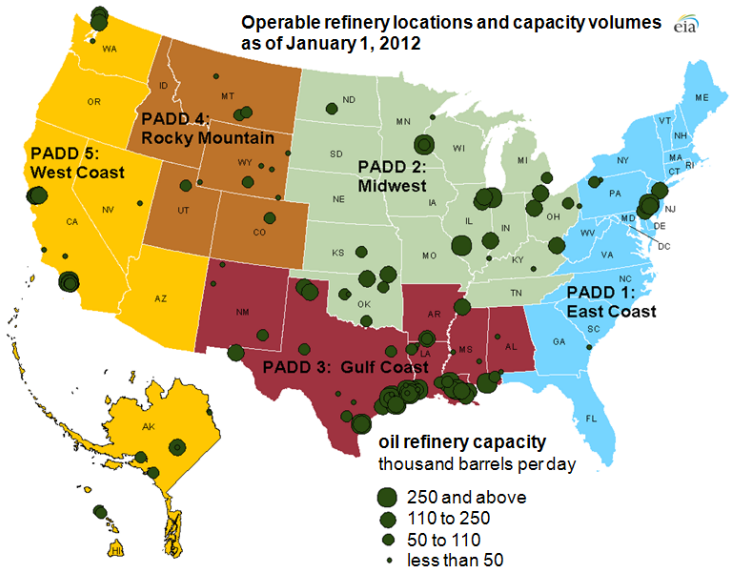
Petroleum supply chain

Gasoline supply chain overview



US refining capacity is highly concentrated

Operable refinery locations and capacity volumes as of January 1, 2012 



The pipeline network is incomplete – so geography matters a lot!

Domestic Oil & Gas Policy

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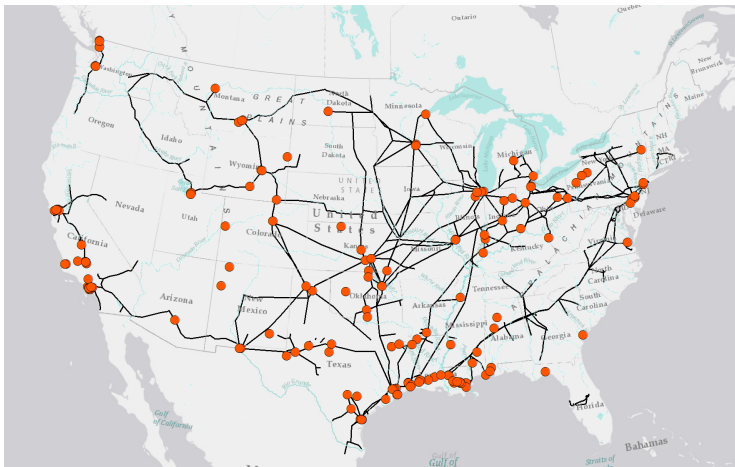
Carbon tax

Keystone

Counterfactuals

Rail

Jones Act



Until recently, the crude exports were banned

- Passed after the Arab Oil Embargo, the US had not allowed crude exports since 1975
- Was fairly innocuous when domestic production was falling. But following the shale boom **domestic drillers** lobbied aggressively to have the ban removed.
- In December 2015 Congress abruptly ended the ban, and President Obama signed it into law.

Cost pass-through

How much are oil price changes passed on to consumers?

- Key political question in Keystone and export ban debate
- Also important for a carbon tax!
- Under perfect competition, answer depends on relative slope of supply and demand.
- Under imperfect competition, depends on the nature of competition (how many firms and how intensely do they compete), and the distribution of cost socks.

Empirical evidence: fracking boom

Pass-Through of Input Cost Shocks Under Imperfect Competition: Evidence from the U.S. Fracking Boom

Erich Muehlegger, Richard L. Sweeney

NBER Working Paper No. 24025

Issued in November 2017

NBER Program(s): Environment and Energy Economics

The advent of hydraulic fracturing led to a dramatic increase in US oil production. Due to regulatory, shipping and processing constraints, this sudden surge in domestic drilling caused an unprecedented divergence in crude acquisition costs across US refineries. We take advantage of this exogenous shock to input costs to study the nature of competition and the incidence of cost changes in this important industry. We begin by estimating the extent to which US refining's divergence from global crude markets was passed on to consumers. Using rich microdata, we are able to decompose the effects of firm-specific, market-specific and industry-wide cost shocks on refined product prices. We show that this distinction has important economic and econometric significance, and discuss the implications for prospective policy which would put a price on carbon emissions. The implications of these results for perennial questions about competition in the refining industry are also discussed.

Fracking + export ban caused an unprecedented divergence from global crude prices

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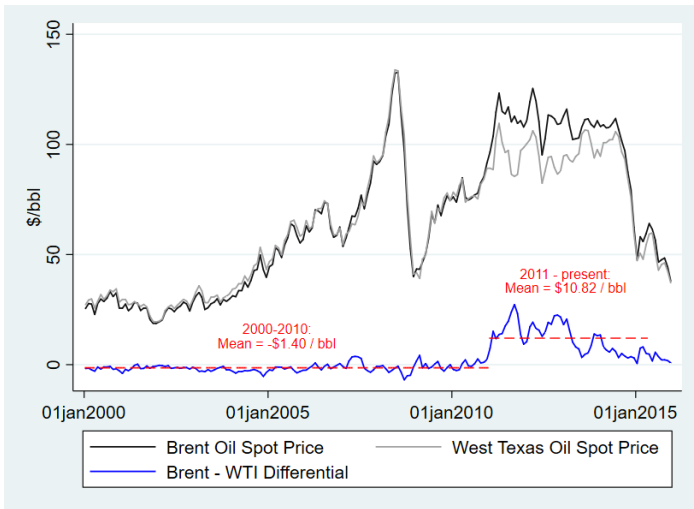
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Location of major US shale oil plays

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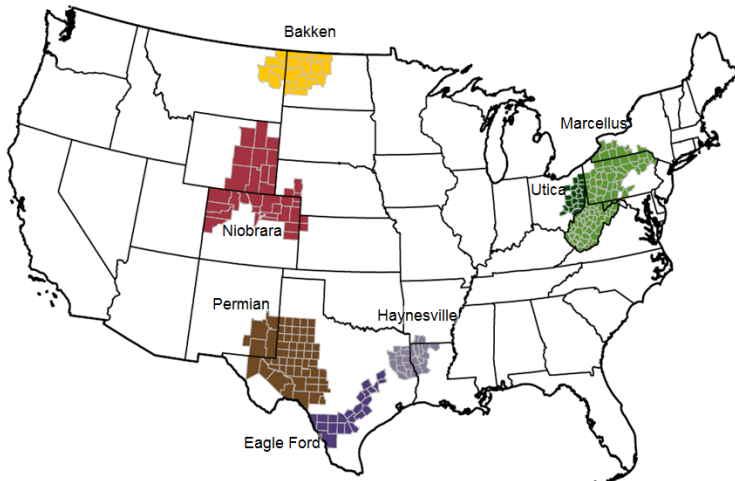
Carbon tax

Keystone

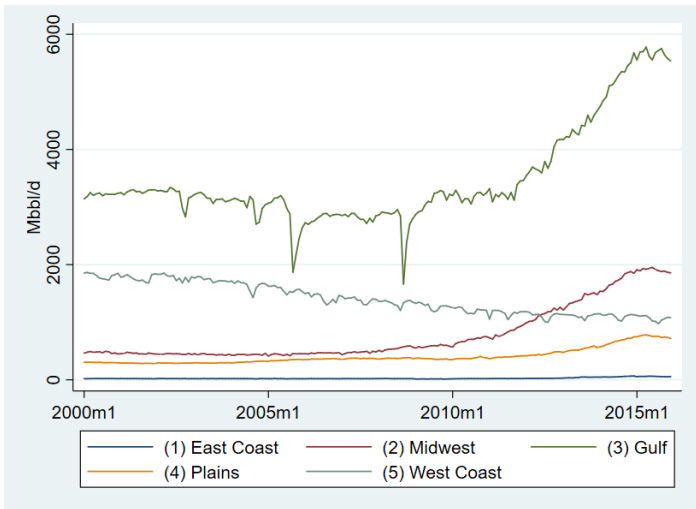
Counterfactuals

Rail

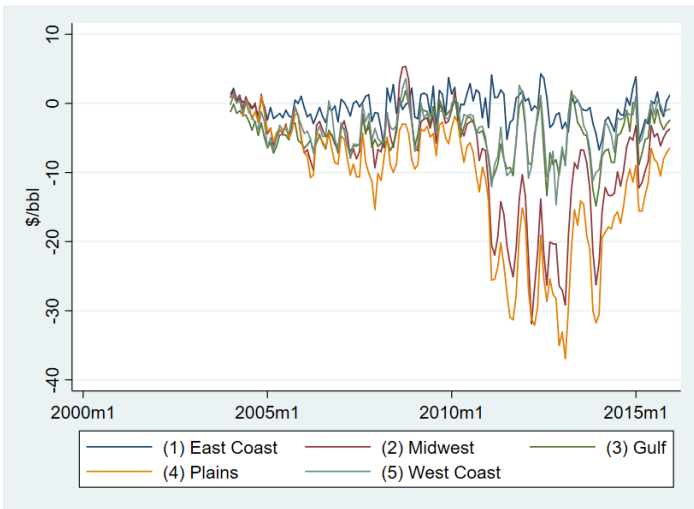
Jones Act



Biggest increases in were in ND (Plains) and TX (Gulf Coast)

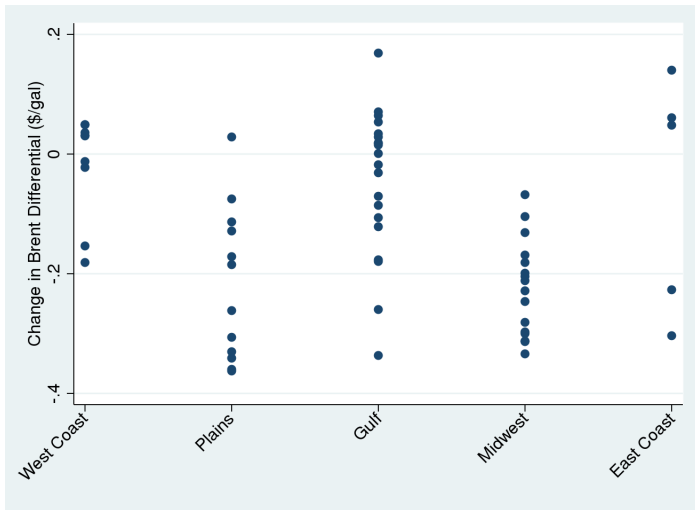


Pipeline constraints caused crude costs to diverge within the US



Even with region, there were winners and losers

Figure: Average cost change relative to Brent post-shale boom



Due to fact that shale oil is very “light”, and some refineries can only process “heavy crude”

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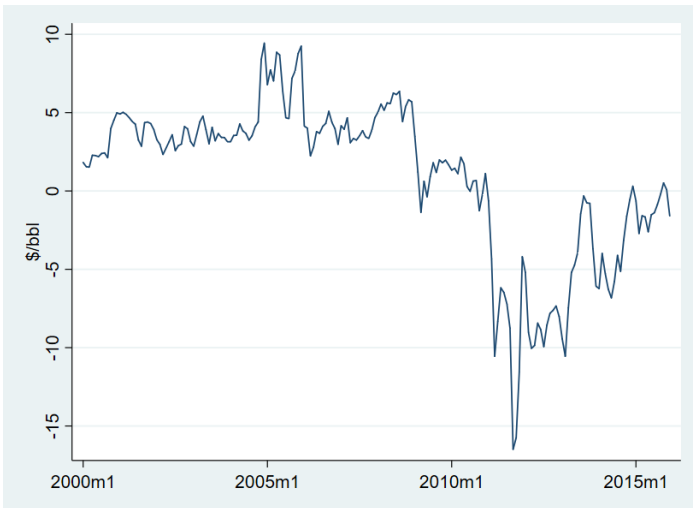
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Counterfactuals

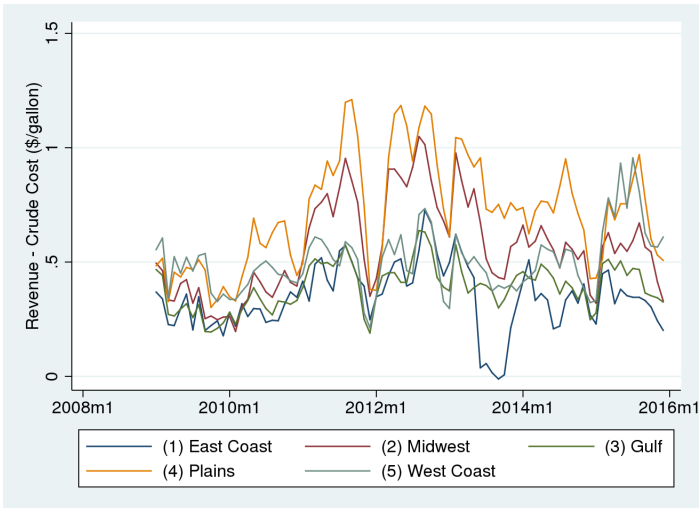
Rail

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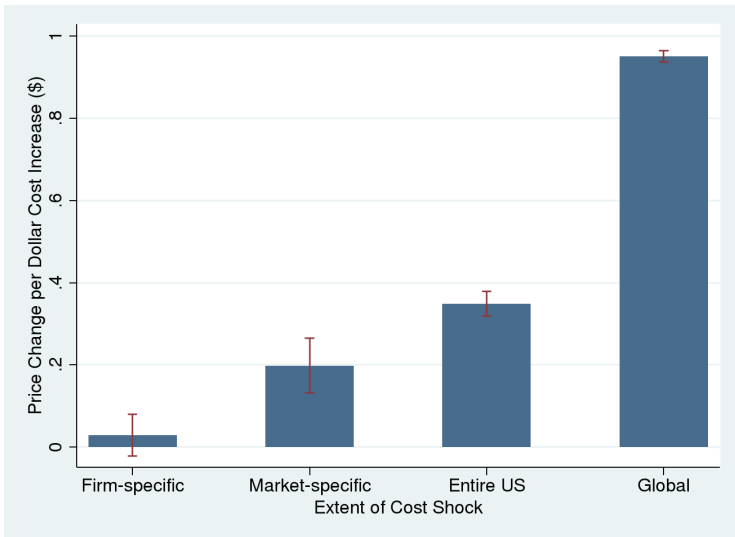
Figure: Domestic Light-Heavy Crude Spread



We estimate how much of those cost reductions were passed on to consumers



Main results: Incidence of a cost change depends on scope of the shock



What does this tell us about the incidence of a carbon tax?

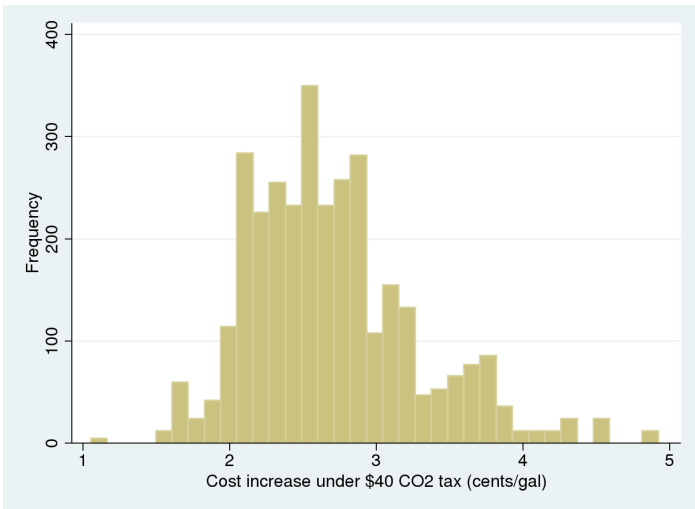
- Over 20% of well-to-wheel gasoline emissions prior to the pump
 - Roughly 10% from refining
- Annual facility level emissions available through [EPA GHGRP](#)
- Second highest ranked sector in terms of GHG emissions per facility (behind Power Plant Sector)
 - average of 1.22 MMT CO₂e
- 145 facilities ~ 3% total US GHG emissions

What does this tell us about the incidence of a carbon tax?

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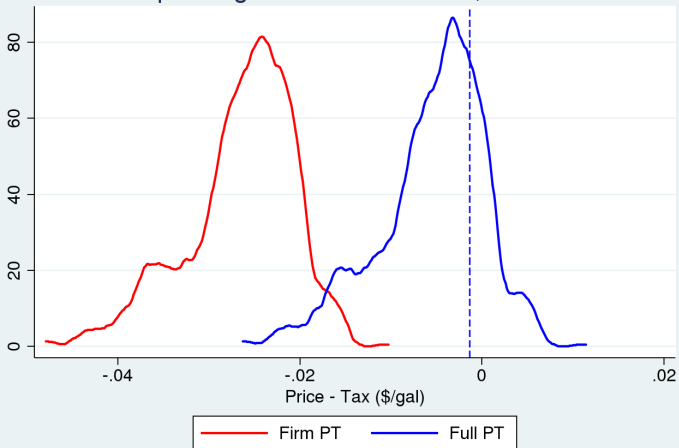
Idea: Even though we don't currently tax refinery carbon emissions, we can predict what might happen to prices from our pass-through estimates.

CO2 tax heterogeneity under \$40 CO2 tax



Based on annual data (2011-2015) in EPA GHGRP

Markup change distribution under \$40 CO2 Tax

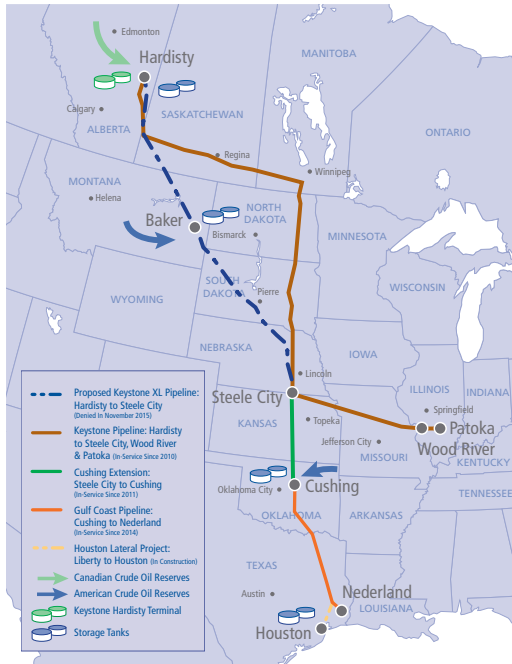


- direct effect alone predicts large losses
- adding indirect effects implies full PT

Keystone

The Keystone XL Pipeline Debate

- Proposed by TransCanada in September 2008
- Two major segments
 - 875 pipeline miles - enter U.S into Montana, pass through South Dakota, and terminate in Steele City, Nebraska.
 - 485 mile “Gulf Coast Project” —would connect an existing pipeline in Cushing, OK, with locations in southern Texas.
- Capacity to deliver 830,000 barrels per day (bpd)
- The 36-inch-diameter pipeline would require a 50-foot-wide permanent right-of-way along the route.
 - 88% of the pipeline path would be on privately owned land
- DOS denied TransCanada’s initial permit application in January 2012.
- Pres. Trump revived process in 2017
- Pres. Biden denied a key permit on day one, effectively killing the project



- - - Proposed Keystone XL Pipeline:
 Hardisty to Steele City
 (Denied in November 2015)
- Keystone Pipeline: Hardisty
 to Steele City, Wood River
 & Patoka (In Service Since 2010)
- Cushing Extension:
 Steele City to Cushing
 (In Service Since 2011)
- Gulf Coast Pipeline:
 Cushing to Nederland
 (In Service Since 2014)
- - - Houston Lateral Project:
 Liberty to Houston (In Construction)
- ➔ Canadian Crude Oil Reserves
- ➔ American Crude Oil Reserves
- 🛢️ Keystone Hardisty Terminal
- 🛢️ Storage Tanks

Why the need for a new pipeline?

- Tar sands (or oil sands) are a combination of clay, sand, water, and bitumen, a heavy black viscous oil.
- The bitumen in tar sands cannot be pumped from the ground in its natural state;
- Instead tar sands are mined, usually using strip mining or open pit techniques.
- About two tons of tar sands are required to produce one barrel of oil
- Over 2 trillion bbls of tar sands across world



Extracting emissions from tar sands are much higher than conventional oil

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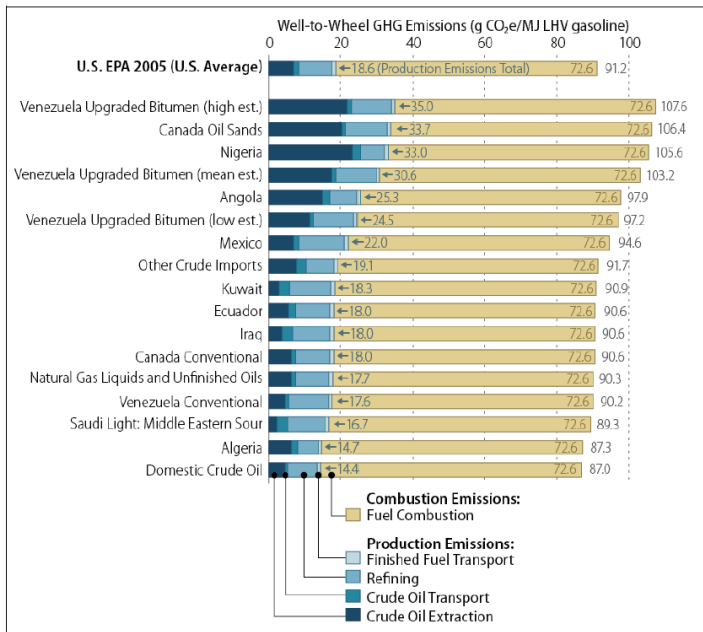
Jones Act



© J Henry Fair/IndustrialSears.com

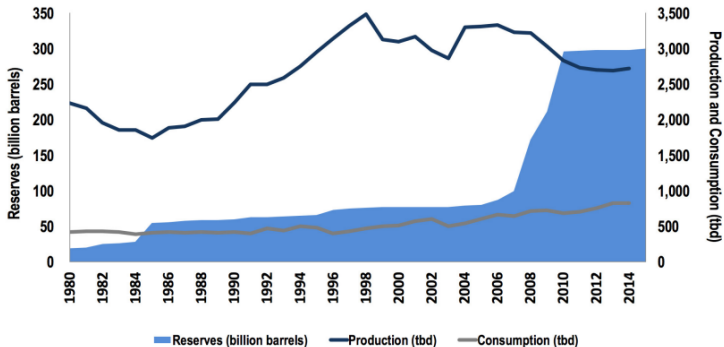
But these are only a small share of lifecycle emissions

Figure 9. Well-to-Wheel GHG Emissions Estimates for Global Crude Resources



Why does the pipeline go to Texas?

Venezuelan reserves, production and consumption since 1980



Venezuela has the largest proven oil reserves in world (297 billion barrels)

Should the US approve the Keystone pipeline?

**Domestic Oil
& Gas Policy**

**Prof. Richard
Sweeney**

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Should the US approve the Keystone pipeline?

Pros

- Gulf Coast refinery profits
- Reduce price at the pump (?)
- Jobs (?)
- Energy security (?)

Cons

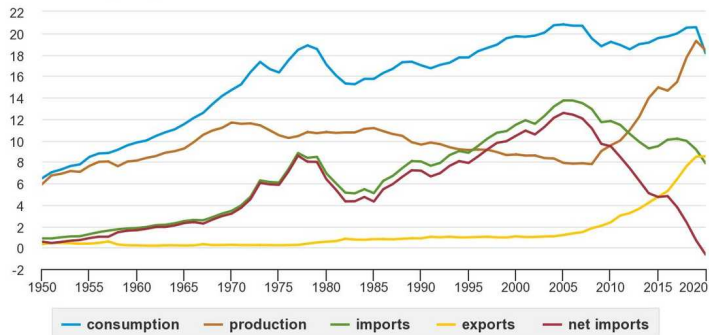
- Climate change (?)
- Risk of an oil spill (?)

Are these cons clear cut? What is the relevant policy counterfactual?

Current trend is towards exports

U.S. petroleum consumption, production, imports, exports, and net imports, 1950-2020

million barrels per day



Source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 3.1, March 2021, preliminary data for 2020

Wrap up

- Policies which seek to influence crude oil markets mainly motivated by desire to reduce gas prices.
- Petroleum supply is both incredibly integrated and subject to important technical and logistical constraints. This makes policy hard.
- Even though US crude oil production has skyrocketed, it's still a relatively small share of the global market.
- As such, policy to encourage supply is more likely to benefit producers than consumers.

Counterfactuals

Are there really environmental benefits to blocking the pipeline?

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What is the right “counterfactual”?

Other pipelines can carry tar sands oil to the US





Harper Builds Oil Link With China After Obama Keystone 'Slap'

by Theophilos Argitis and Jeremy van Loon

January 25, 2012 - 12:01 AM EST



Canada pushes Trans Mountain pipeline to sell oil to China far beyond US shores

PUBLISHED THU, JUN 7 2018 · 1:31 PM EDT | UPDATED THU, JUN 7 2018 · 3:54 PM EDT



Patti Domm
@PATTIDOMM

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KEY POINTS

- The Canadian government has opted to buy a pipeline project that will more than double the oil its energy industry can send to the West Coast — and then on to new markets in Asia.
- The purchase comes, coincidentally, during the thick of a bitter trade dispute with the U.S., the only customer for its crude oil.
- By building the Trans Mountain expansion, Canada will be able to sell oil outside North America, bringing in higher prices for its oil.
- The move should be good for Canadian producers and the government, which will collect more tax dollars from the crude.

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Despite rejecting the pipeline, the DOS concluded the climate impacts of Keystone to be minimal

- DOS's 2014 Final Environmental Impact Statement (FEIS) estimated that the incremental (i.e., net) life-cycle GHG emissions associated with the pipeline would be 1.3 to 27.4 million metric tons of carbon dioxide per year (0.02%-0.4% of U.S. annual GHG emissions).
- In addition, the FEIS stated that the "approval or denial of any one crude oil transport project, including the proposed project, is unlikely to significantly impact the rate of extraction in the oil sands or the continued demand for heavy crude oil at refineries in the United States based on expected oil prices, oil-sands supply costs, transport costs, and supply-demand scenarios."

Pipelines aren't the only way to move oil

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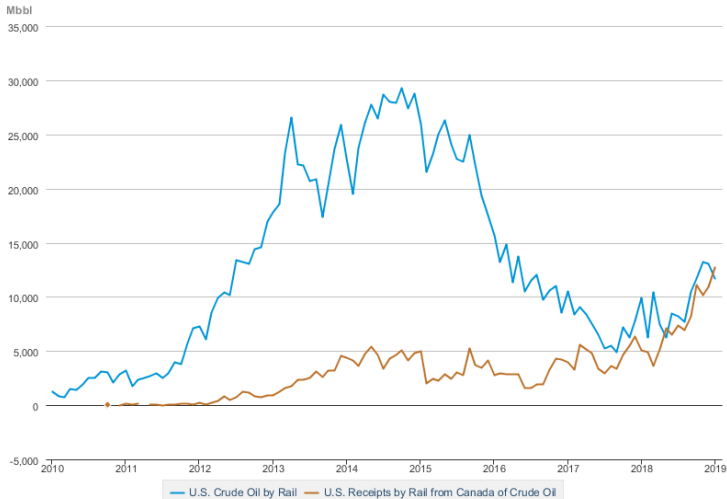
Rail

Jones Act



Sharp increase in CBR in response to pipeline constraints

Movements of Crude Oil and Selected Products by Rail



Source: U.S. Energy Information Administration

Rail more flexible than pipelines

- Rail network in US useful for shipping lots of goods, not just oil. (some evidence CBR actually caused an increase in grain prices)
- This is important, because crude differentials are typically fleeting.
- If well dry up, or other regions increase supply, rail is still useful, but the pipeline isn't.
- Covert and Kellogg suggest we should think of rail more terms of "peaker" flexibility to be used in conjunction with (smaller) pipelines.

Is this preferable to a pipeline?

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Is this preferable to a pipeline?

The External Costs of Transporting Petroleum Products by Pipelines and Rail: Evidence From Shipments of Crude Oil from North Dakota

Karen Clay, Akshaya Jha, Nicholas Muller, and Randall Walsh

NBER Working Paper No. 23852

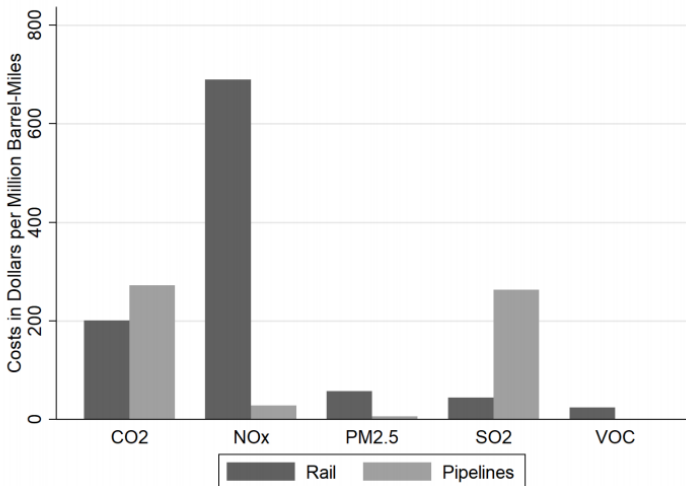
September 2017

JEL No. L92,Q53,Q54

ABSTRACT

This paper constructs new estimates of the air pollution and greenhouse gas costs from long-distance movement of petroleum products by rail and pipelines. While crude oil transportation has generated intense policy debate about rail and pipeline spills and accidents, important externalities – air pollution and greenhouse gas costs – have been largely overlooked. Using data for crude oil transported out of North Dakota in 2014, this paper finds that air pollution and greenhouse gas costs are nearly twice as large for rail as for pipelines. Moreover, our estimates of air pollution and greenhouse gas costs are much larger than estimates of spill and accidents costs. In particular, they are more than twice as big for rail and more than eight times as big for pipelines. Our findings indicate that the policy debate surrounding crude oil transportation has put too much relative weight on accidents and spills, while overlooking a far more serious source of external cost: air pollution and greenhouse gas emissions.

Figure 5: Air Pollution and Greenhouse Gas Damages for Transportation by Railroad and Pipelines to the Gulf Coast by Pollutant



What about oil spills?

- Pipeline runs right through the Heartland
- Post BP this was very much on people's minds
- But pipelines are probably the safest way to move oil

Major CBR Incidents

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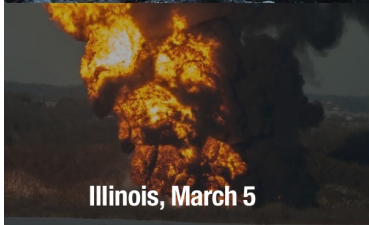
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Ontario, February 14



West Virginia, February 16



Illinois, March 5



Ontario, March 7

Source: www.priceofoil.com

Rail accidents 2010

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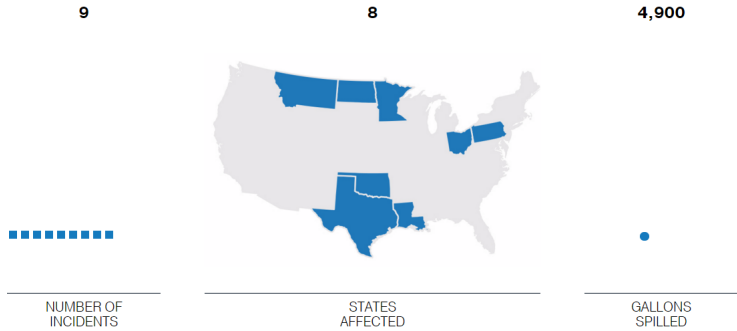
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Source: National Geographic

Rail accidents 2014

Prof. Richard Sweeney

2010 | 2011 | 2012 | 2013 | **2014**

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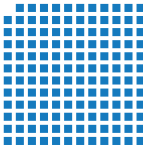
Rail

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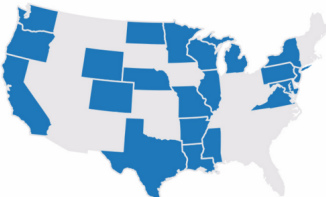
143

21

57,600



NUMBER OF INCIDENTS



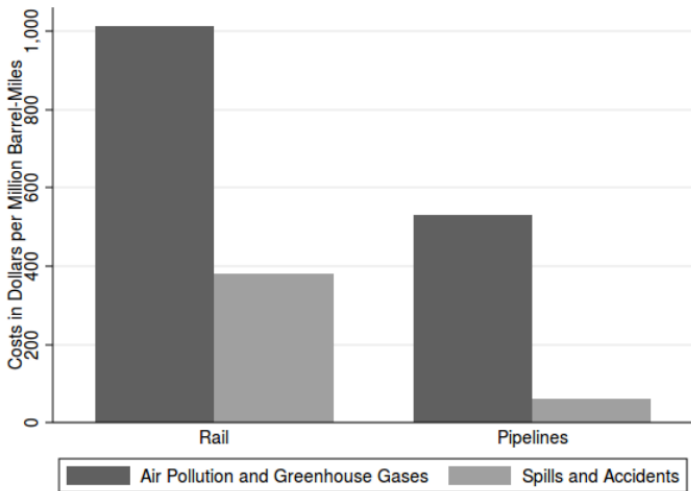
STATES AFFECTED



GALLONS SPILLED

Source: National Geographic

Figure 6: Air Pollution and Greenhouse Gas Damages and Spill and Accident Costs for Transportation of Crude Oil by Railroad and Pipelines to the Gulf Coast



Keystone wrap-up

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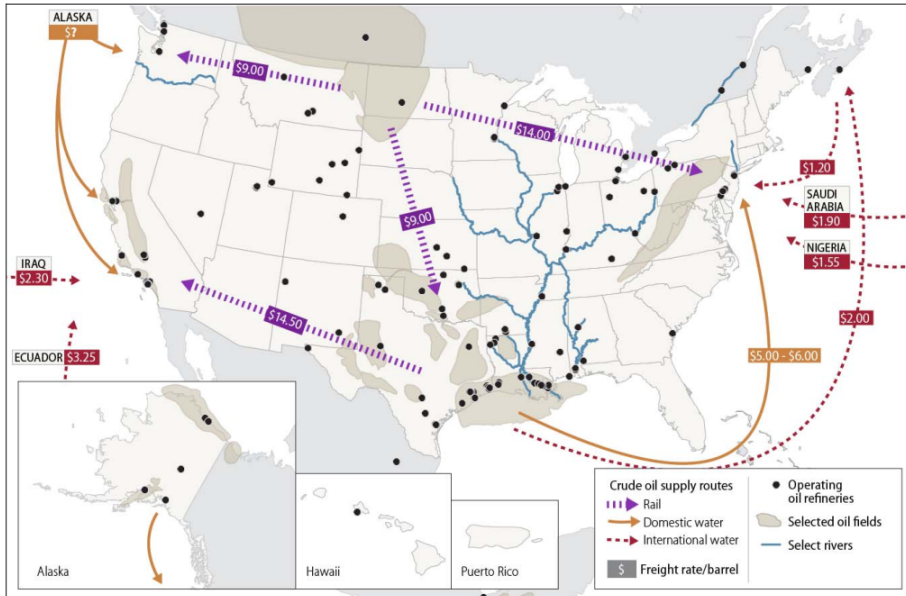
- Main point: counterfactuals are hard
- Benefits and costs both look small
- Especially given the incredible attention this pipeline got

Jones Act

What about water shipping?

Figure 3. Selected Water and Rail Crude Oil Supply Routes

(Freight rates per barrel)



Has also increased recently

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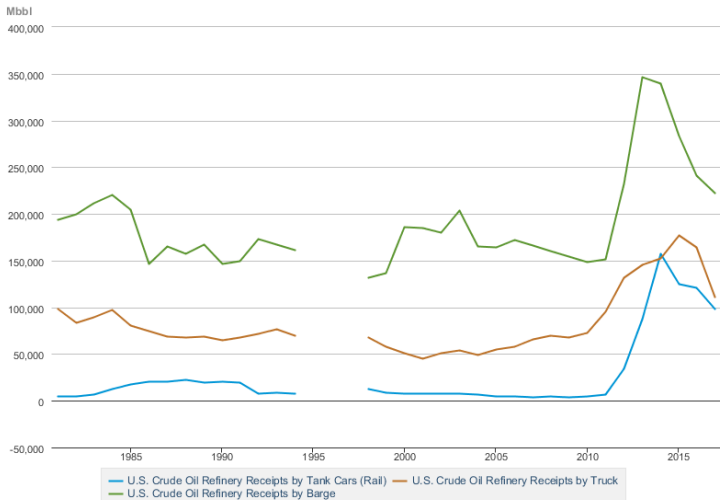
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Refinery Receipts of Crude Oil by Method of Transportation



Source: U.S. Energy Information Administration

JONES ACT 101

- “Jones Act” is the common name for the *Merchant Marine Act of 1920*¹
- Regulates maritime commerce between U.S. ports
- Originally established for “...national defense and for the proper growth of its foreign and domestic commerce...”
- Applies to:
 - Ships transporting goods via water between U.S. ports
- Requirements: The ship must be:
 - “U.S. flagged”
 - Constructed in the U.S.
 - Owned by U.S. citizens
 - At least 75% crewed by U.S. citizens
 - Follow U.S. safety rules
- Costs significantly more than equivalent foreign-flagged vessels to operate

¹Copy of original text - https://www.law.cornell.edu/uscode/html/uscode46a/uscode46a.usc_sup_05_46_10_24.html

Distorts a lot more than just oil





Jim Walker's

CRUISE LAW NEWS

Everything Cruise Lines Don't Want You to Know



 Report a Tip

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Why Can't You Cruise From One U.S. Port to Another U.S. Port?

By [Jim Walker](#) on September 9, 2011

POSTED IN [FLAGS OF CONVENIENCE](#)

Every so often we receive an email or telephone call from someone asking why cruise ships can't sail from one U.S. port to another.

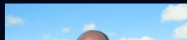
PUBLISHED BY

JIM WALKER

of

WALKER & O'NEILL
MARITIME LAWYERS

ABOUT JIM WALKER



What is the Jones Act?

The Jones Act (the U.S. Merchant Marine Act of 1920, Section 27) requires that cargo may be shipped between two U.S. ports only on a vessel that is:

- Made in America
- Owned by American citizens
- Has a primarily (3/4) American crew

Cost of shipping from a 40-foot container from Los Angeles to...

Shanghai:
\$790

Hawaii:
\$8,700¹¹

Limits our disaster response



Damage done to Puerto Rico by the Jones Act illustrates the need to repeal the law

BY MARK J. PERRY, OPINION CONTRIBUTOR — 10/03/18 04:00 PM EDT

THE VIEWS EXPRESSED BY CONTRIBUTORS ARE THEIR OWN AND NOT THE VIEW OF THE HILL

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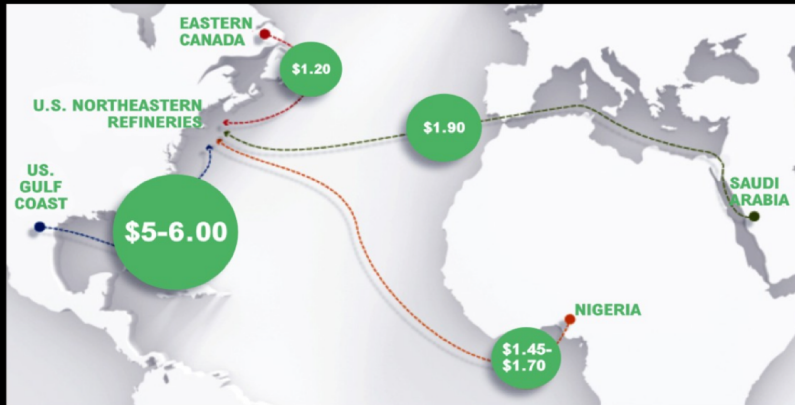
TWEET



Oil market efficiency costs look large

- USGC now producing more oil than it can process
- "But in the history of the world, there has never been an oil boom like the one that is happening now in the United States.... The biggest previous oil boom was in Saudi Arabia in the late 1960s, when it increased production by 1 million barrels of oil per day in a year. In just the last year, U.S. oil production is up more than two million barrels per day, and more than half of that increase is in Texas. In real terms, oil is worth more than twice what it was in the 1960s, so in monetary terms the current boom dwarfs any previous episode. Simply put, it is the biggest commodity boom the world has ever seen."
- No pipeline access for many US refineries (in particular, East Coast)
- Barges (probably) safer than rail

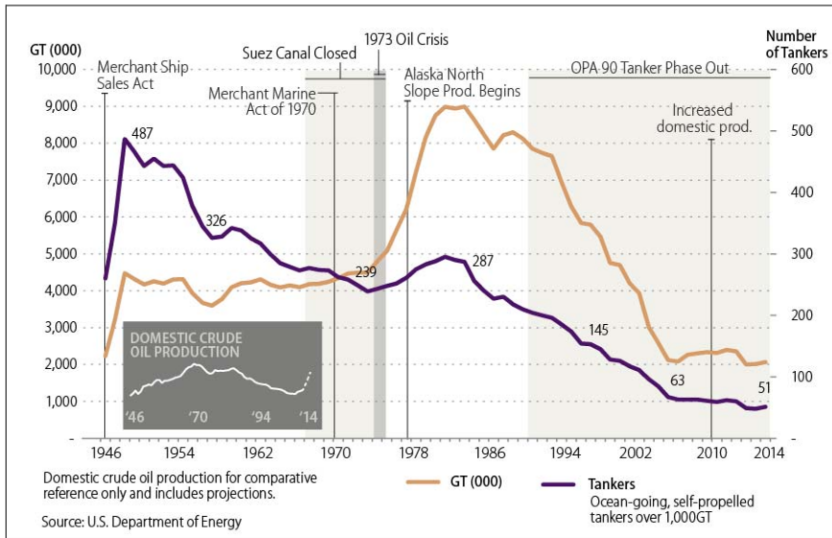
The Cost of Shipping Crude Oil to U.S. Northeastern Refineries (in dollars per barrel)



Source: Texas Comptroller of Public Accounts (2016) and Congressional Research Service (2014)

EconoFact

econofact.org



Source: CRS modification of figure from U.S. Maritime Administration.

Notes: GT= gross tonnage, an indication of the cargo capacity of a ship. Figures pertain to both Jones Act (domestic) and international tankers.

Entry prohibitively costly

Table 3. U.S. and World Prices for Tanker Vessels

(Cost of a newbuild, based on recent deliveries or construction contract announcements)

Vessel Type	Capacity	U.S. Price	World Price
Handysize product tanker (aka medium-range tanker)	40,000-50,000 dwt 330,000 bbl	\$100-\$135 million	\$30-\$35 million
Ocean-going ATB (smaller)	27,000 dwt 185,000 bbl	\$60-\$85 million	not available
Ocean-going ATB (larger)	45,000 dwt 250,000-300,000 bbl	\$100-\$130 million	not available
Aframax tanker	80,000-120,000 dwt 650,000-800,000 bbl	\$200 million	\$45-\$55 million
Suezmax tanker	130,000-160,000 dwt 1 million bbl	No recent builds	\$55-\$65 million
Very Large Crude Carrier (VLCC)	200,000-320,000 dwt 2 million bbl	No recent builds	\$90-\$100 million

Source: U.S. Maritime Administration, Title XI Ship Financing Guarantees, Pending and Approved Loan Applications; American Petroleum Tankers S-I SEC Filing; RBN Energy LLC; RS Platou Economic Research, annual and monthly reports; press releases from Kinder Morgan, Teekay Tankers, Scorpio Tankers, Euronav; Poten and Partners, *Weekly Tanker Opinion*.

Results in obvious inefficient allocations

- EIA data shows 5 times as much crude oil has been shipped from Texas to Canadian refineries as to northeastern US refineries.
- In many months in the winter, we export diesel from Texas to Europe, and import it from Europe to New England.
- Recently refineries in PA have been closing, publicly citing high crude acquisition costs.

What would happen if we repealed the Jones Act?

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MS PT

Carbon tax

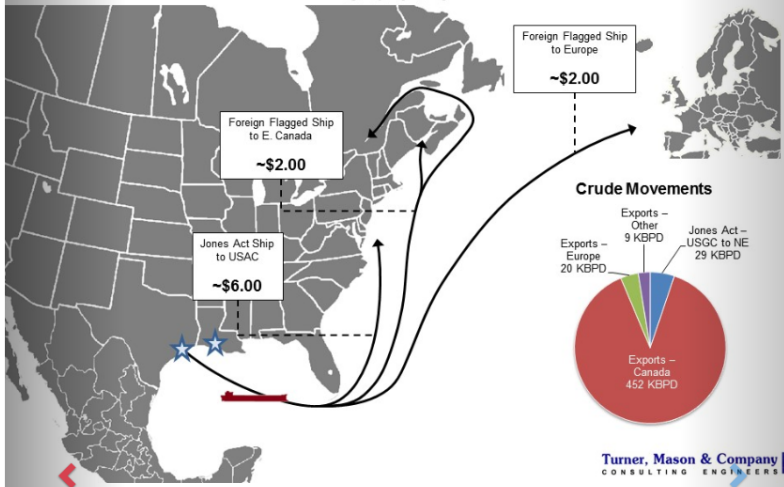
Keystone

Counterfactuals

Rail

Jones Act

NORTHEAST CRUDE TRANSPORTATION COSTS



Who benefits?

- USGS refineries / suppliers unaffected (export market sets the price)
- East Coast refineries input costs decline.
- But domestic competition increases as well.
- So East Coast consumers definitely better off. Unclear about distribution of surplus.

Why does the Jones Act persist?

Domestic Oil
& Gas Policy

Prof. Richard
Sweeney

Background

Fracking

MST

Why does this
matter?

Data

Empirical
Strategy

Details

Results

Discussion

Supply chain

Cost
pass-through

MS PT

Carbon tax

Keystone

Counterfactuals

Rail

Jones Act

Committee on Transportation and Infrastructure
U.S. House of Representatives

Peter A. DeFazio
Chairman

Washington, DC 20515

Sam Graves, MO
Ranking Member

Katherine W. Dedrick, Staff Director

February 6, 2019

Paul J. Sass, Republican Staff Director

The Honorable Kirstjen M. Nielsen
Secretary
U.S. Department of Homeland Security
Washington, D.C. 20528

Dear Secretary Nielsen:

On December 21, 2018, a representative from U.S. Customs and Border Protection, pursuant to notice requirements under 46 U.S.C. 501(b)(3), informed the Committee on Transportation and Infrastructure that it had received a request from the Governor of Puerto Rico to administratively waive the Jones Act for a ten-year period for the movement of Liquid Natural Gas to Puerto Rico on foreign flag tankers. We are writing to express our opposition to this request and ask that you issue a denial of this waiver request.

The Jones Act has been a fundamental pillar of U.S. maritime policy for nearly a century. This policy, which exclusively reserves marine transportation between two points in the United States to vessels built, owned, and flagged in the United States, and manned by U.S. citizens, has served our Nation well. Not only has the Jones Act promoted vibrant economic growth and ensured national security, the Act has created hundreds of thousands of good paying jobs in our domestic maritime trades and shipbuilding industries.