

U.S. Energy Outlook Bright in 2018



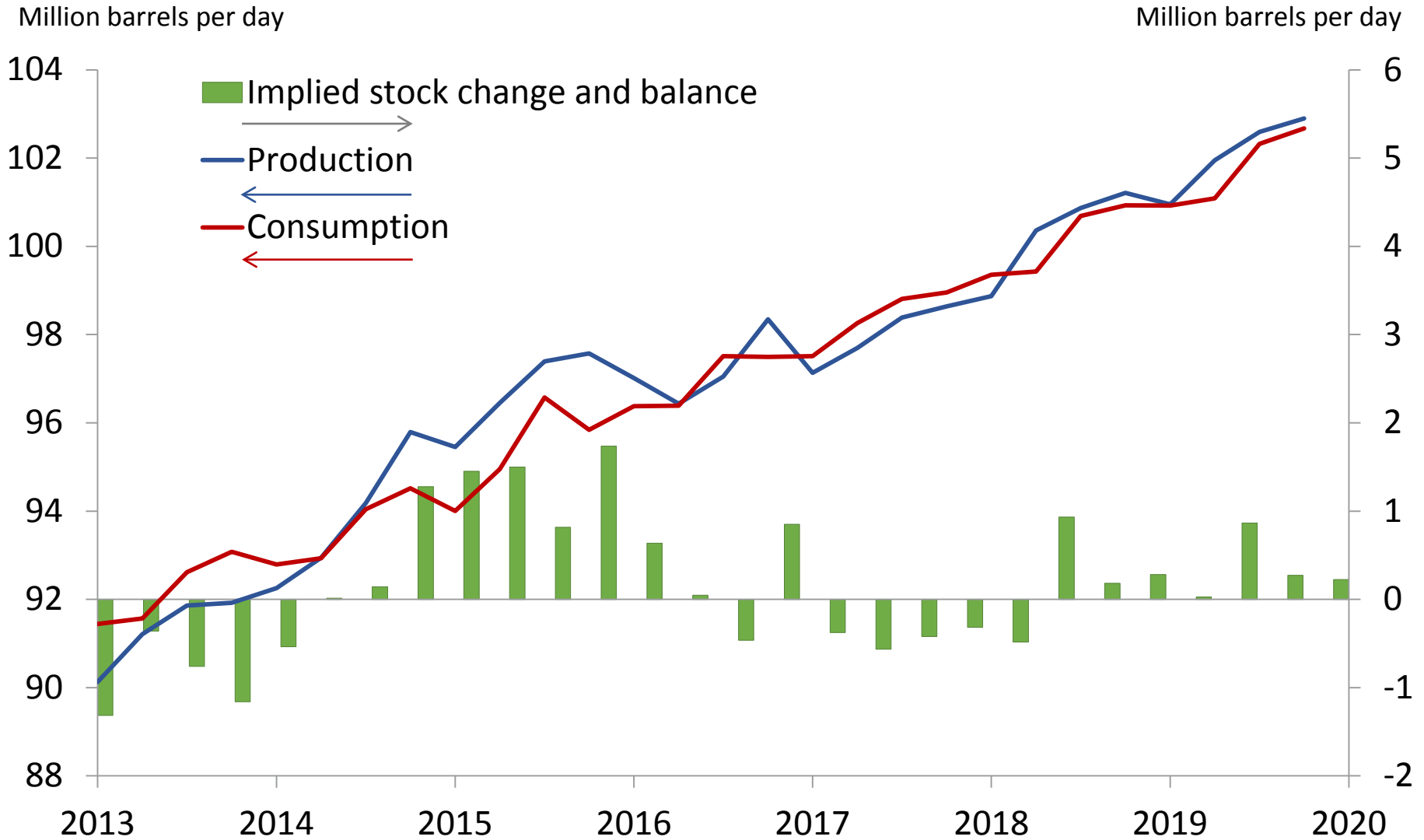
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February 21, 2018

Energy Market Overview

- Global oil market
 - Oil prices between \$45 - \$55 in 2017. Moved up in 2018
 - US oil production on track to a record high in 2018
 - OPEC and friends keeping a lid on production
 - Robust global growth should boost oil demand
- Natural Gas
 - Natural gas market increasingly global
 - US natural gas production a record every year since 2007

Global Oil Balance



OPEC and Non-OPEC Cuts

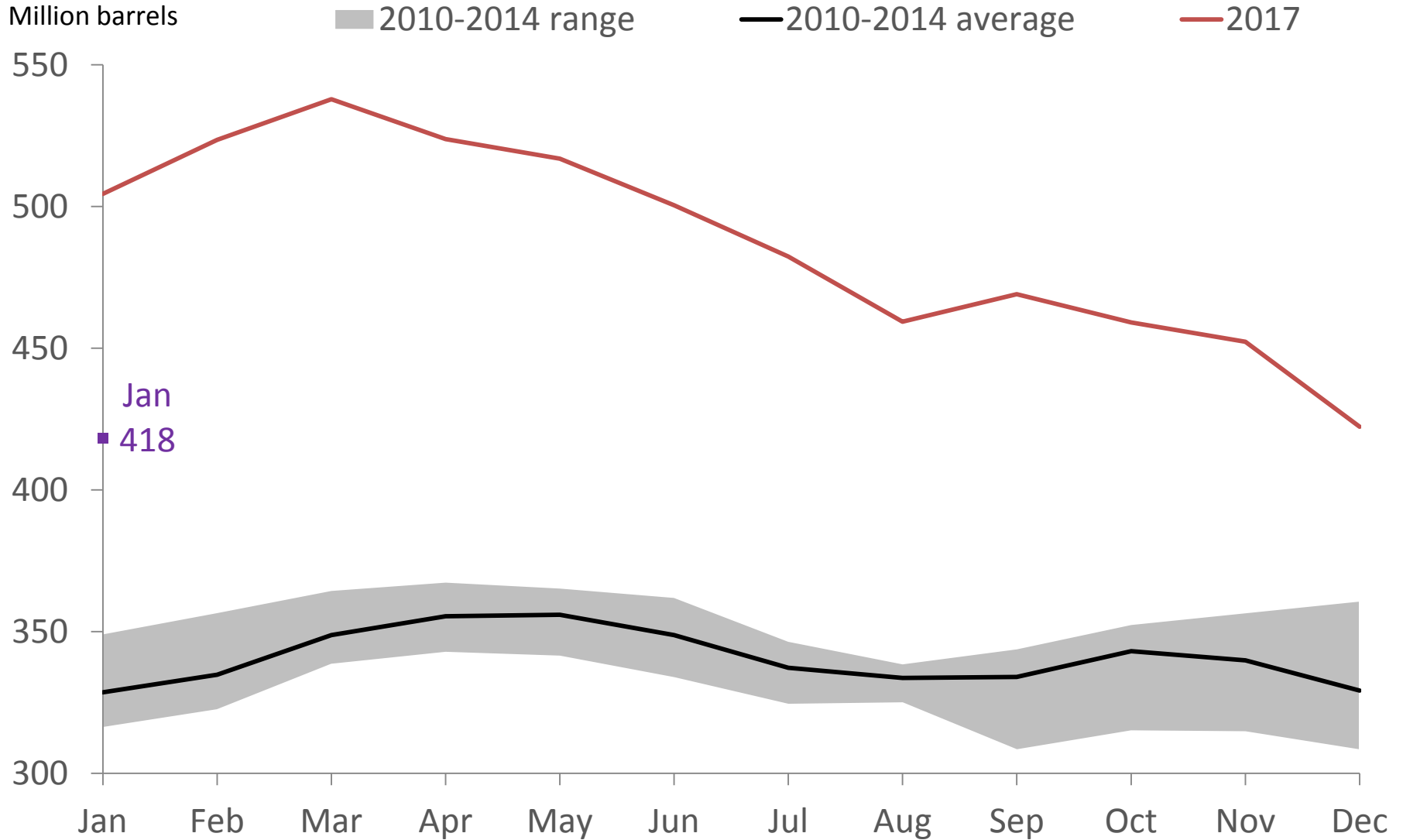
Country/group	Agreed cut (mb/d)	January actual cut (mb/d)	January percent compliance (est.)
Saudi Arabia	-0.49	-0.56	116
Other OPEC	-0.69	-1.05	152
Russia	-0.30	-0.27	88
Other non-OPEC	-0.25	-0.21	85
TOTAL	-1.72	-2.09	121

NOTE: Estimates come from the International Energy Agency's Feb 2018 Oil Market Report.

mb/d: million barrels per day

SOURCE: International Energy Agency.

Crude oil inventories remain high

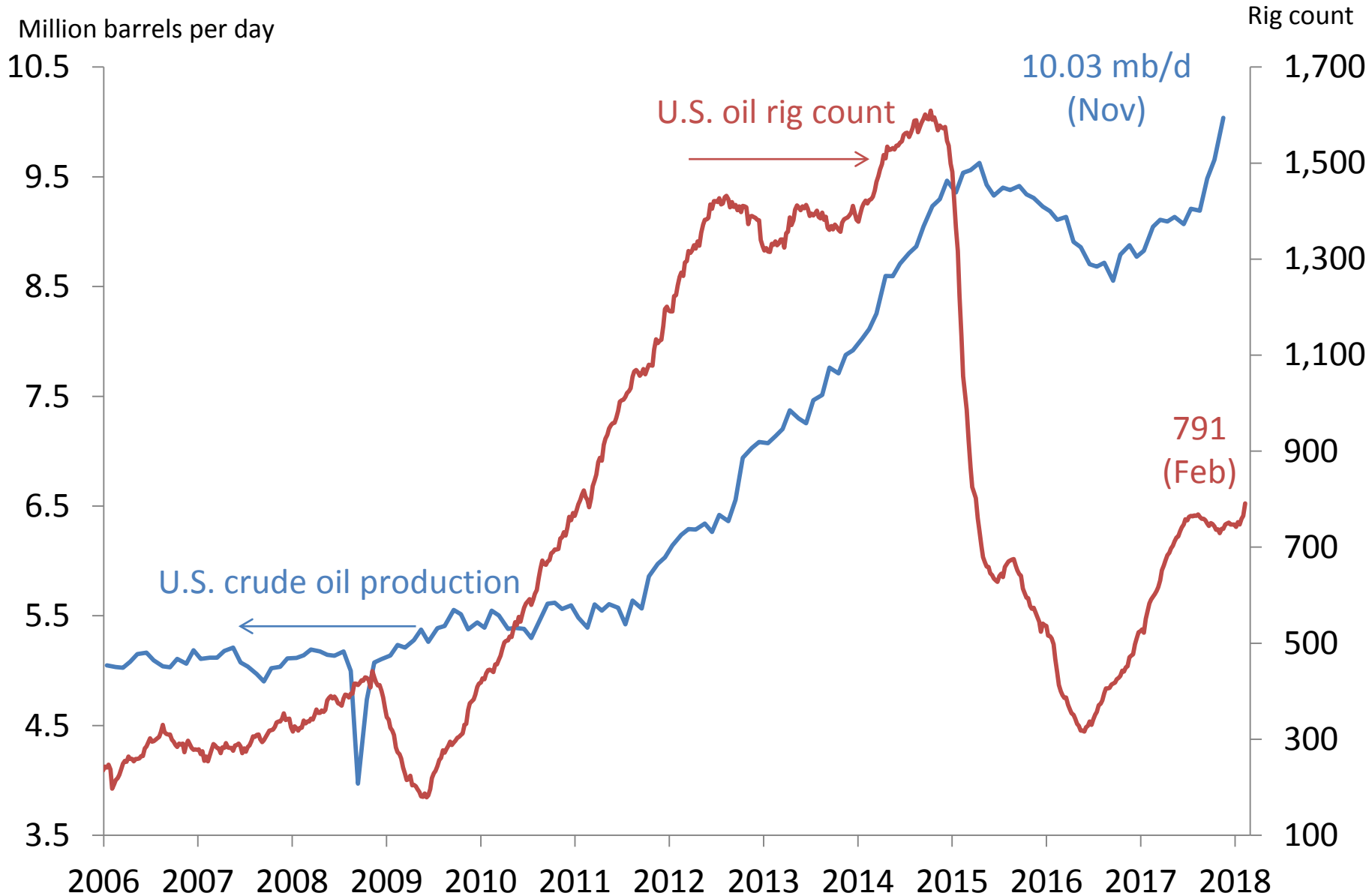


Jan

418

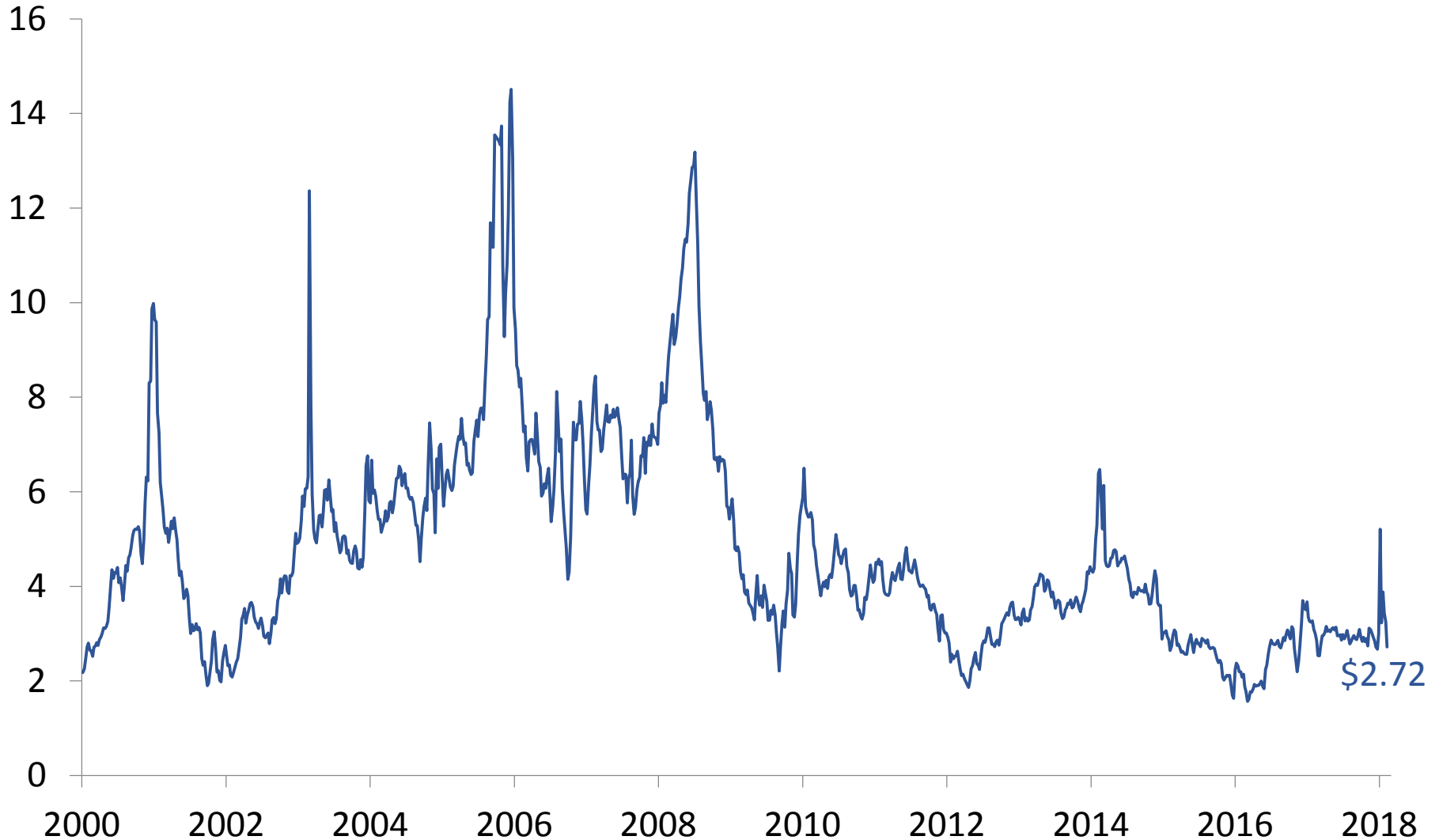
NOTE: Square marks use latest weekly data as of 2/7/2018.
SOURCE: Energy Information Administration.

U.S. production up strongly



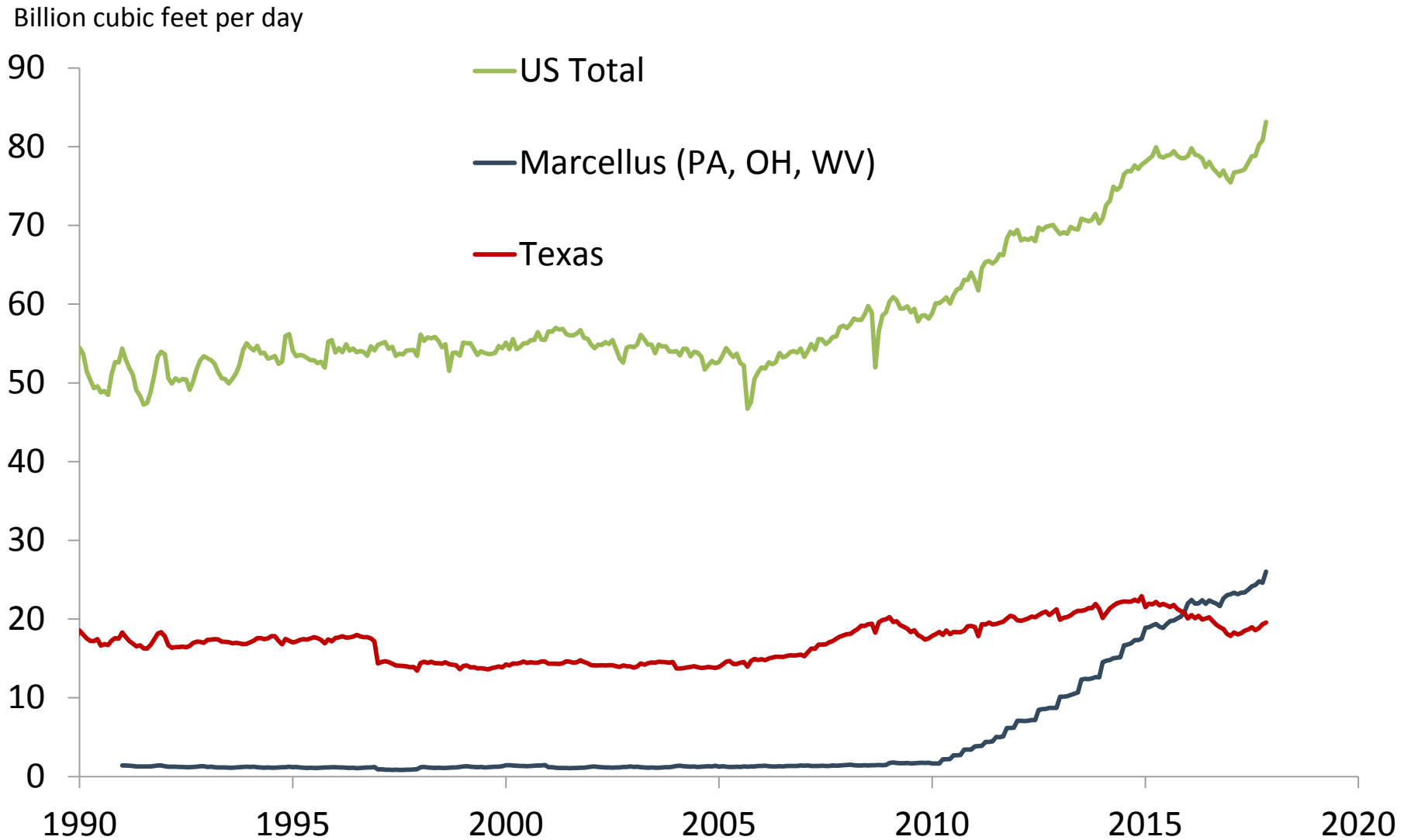
Natural gas prices low

Nominal price, weekly



\$2.72

Natural gas production a record every year



Global Oil and Gas Production

Crude Oil (mb/d)

• World	80.48
• Russia	10.95
• U.S.	10.03
• Saudi Arabia	9.98
• Iraq	4.49
• Texas*	3.97
• Iran	3.81
• China	3.71
• Canada	3.06
• U.A.E.	2.85
• Kuwait	2.70

(Jan. 2018)

Natural Gas (bcf/d)

• World	386.18
• U.S.	83.16
• Russia	73.38
• Qatar	22.33
• Texas	19.58
• Canada	18.29
• Pennsylvania	15.65
• China	15.62
• Iran	15.50
• Norway	12.83
• Saudi Arabia	8.33

(Nov. 2017)

*Estimate based on January weekly data.

SOURCES: Energy Information Administration; International Energy Agency; *Oil and Gas Journal*.

Impact on the Economy

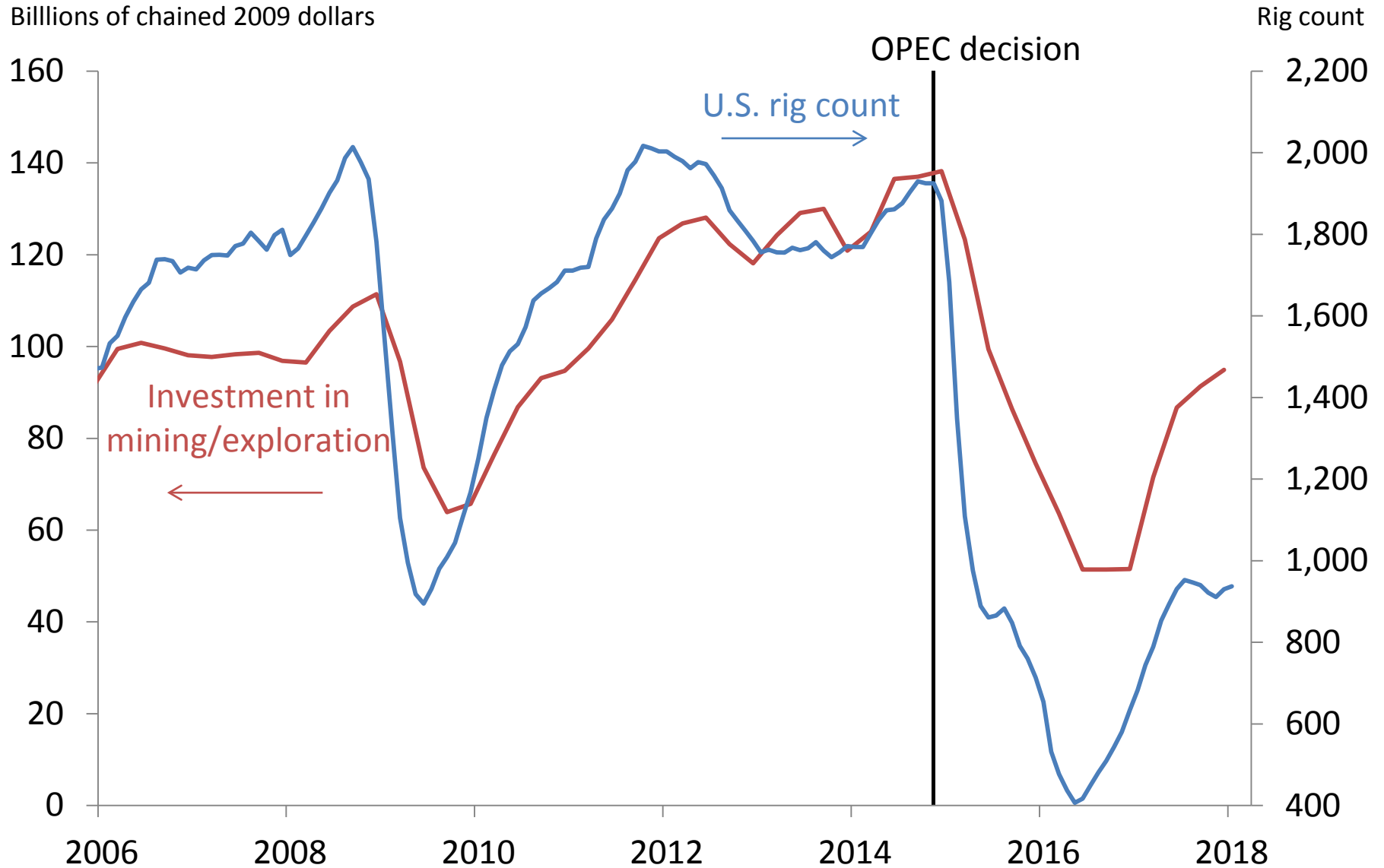
Impact on U.S. economy

- The U.S. benefits from lower oil prices
- Low prices boost consumer disposable income
- Reduces the cost of energy to firms
- Reduces profitability of producing oil
 - Layoffs, capex declines and bankruptcies in oil patch
- Timing of impact on economy may be asymmetric

Why didn't low oil prices have a larger positive effect on the economy?

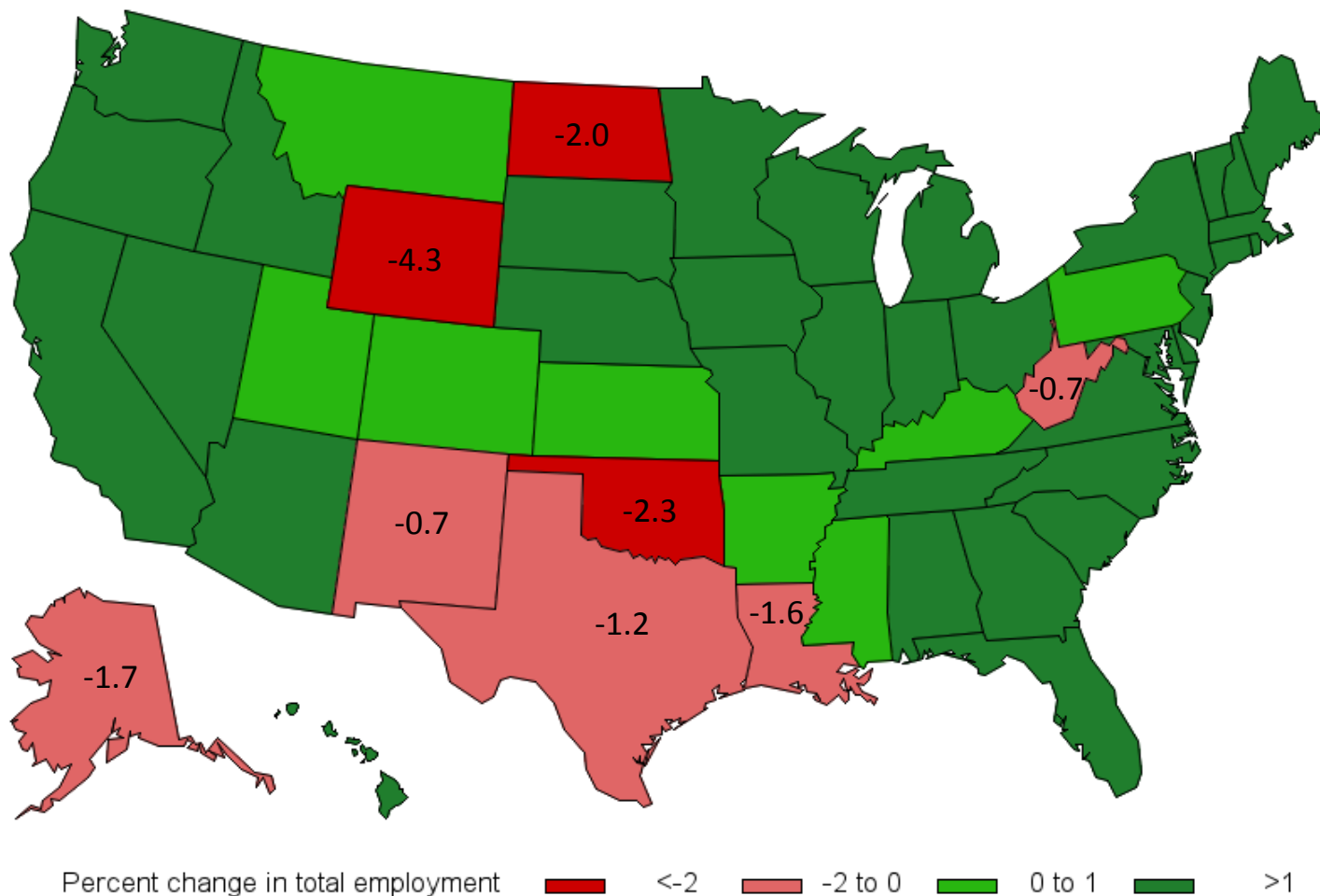
- Oil price changes have asymmetric effects on the economy
- Increases in oil prices impact the economy more than oil price declines
 - Oil price increase: Σ (negative reallocation effects + negative price effects)
 - Oil price decline: Σ (negative reallocation effects + positive price effects)

Oil investment bounces back



Low oil prices benefit most states

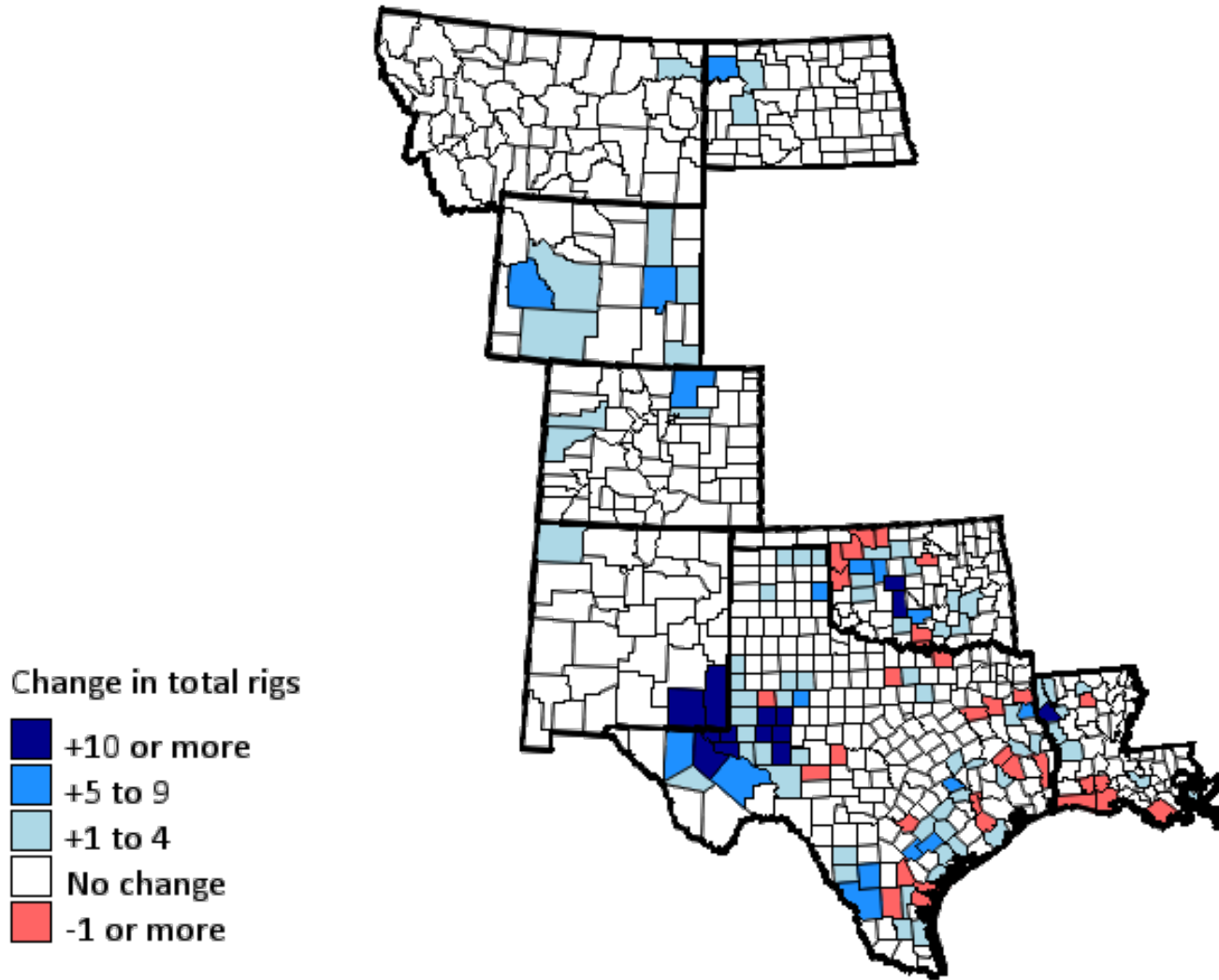
(Effect of a 50% decline in oil prices on employment)



SOURCE: "The Shale Gas and Tight Oil Boom: U.S. States' Economic Gains and Vulnerabilities," by Stephen P.A. Brown and Mine K. Yücel, Council on Foreign Relations, *Energy Brief*, Oct. 2013.

Current State of Oil & Gas Industry

Drilling concentrates on focus areas

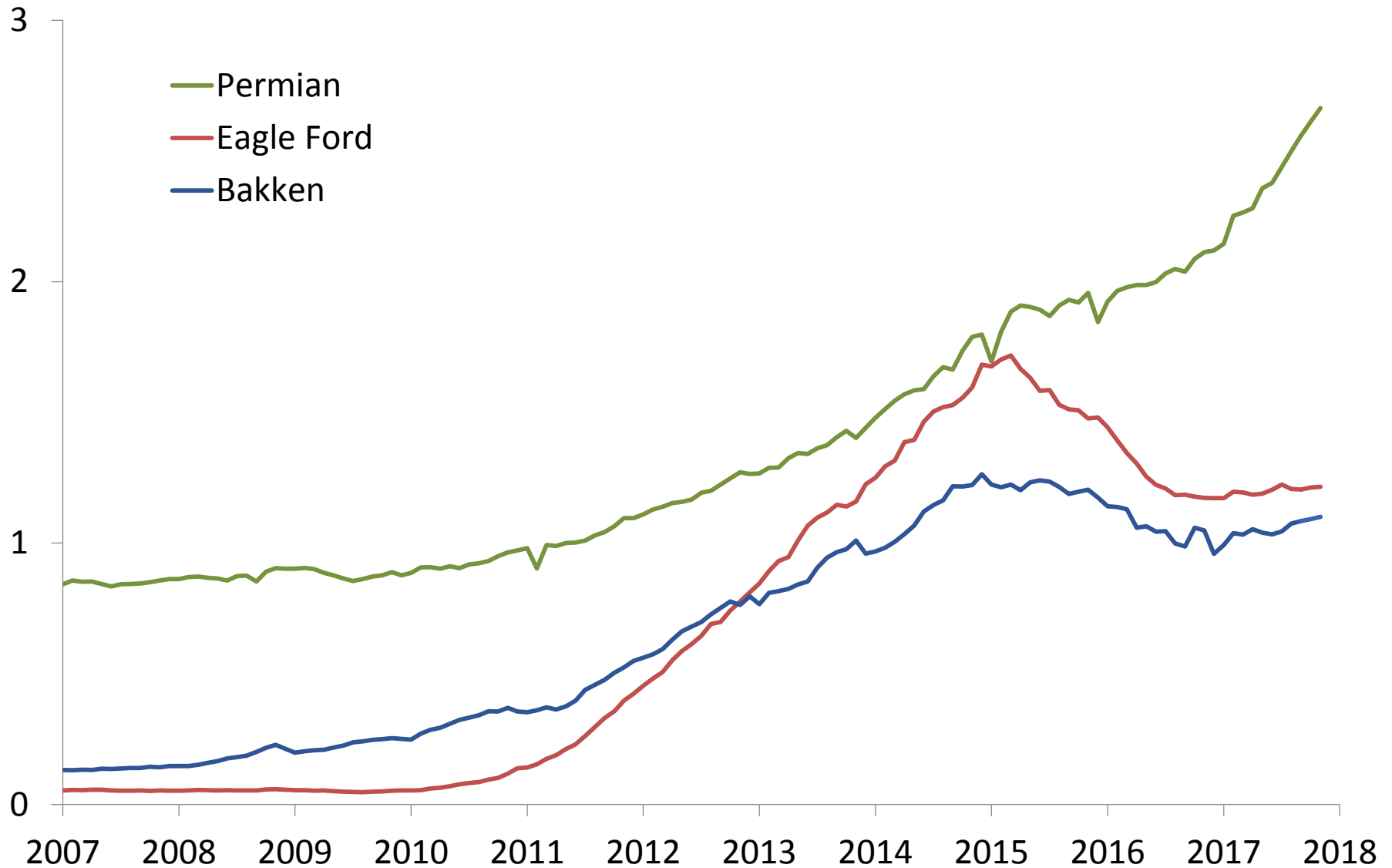


NOTE: Change in active rig count from May 27, 2016, to January 26, 2018.

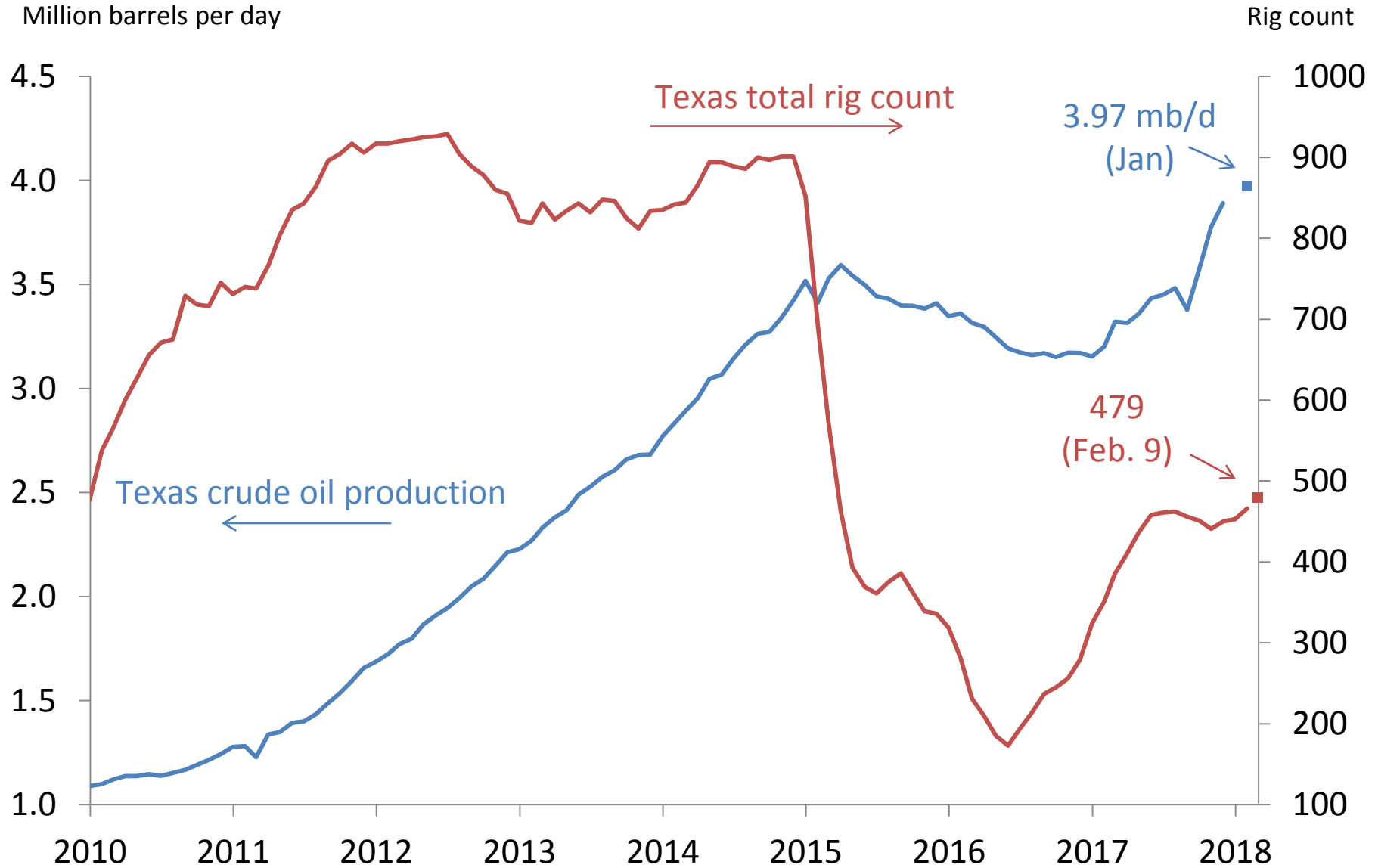
SOURCE: Baker Hughes.

Permian most prolific shale basin

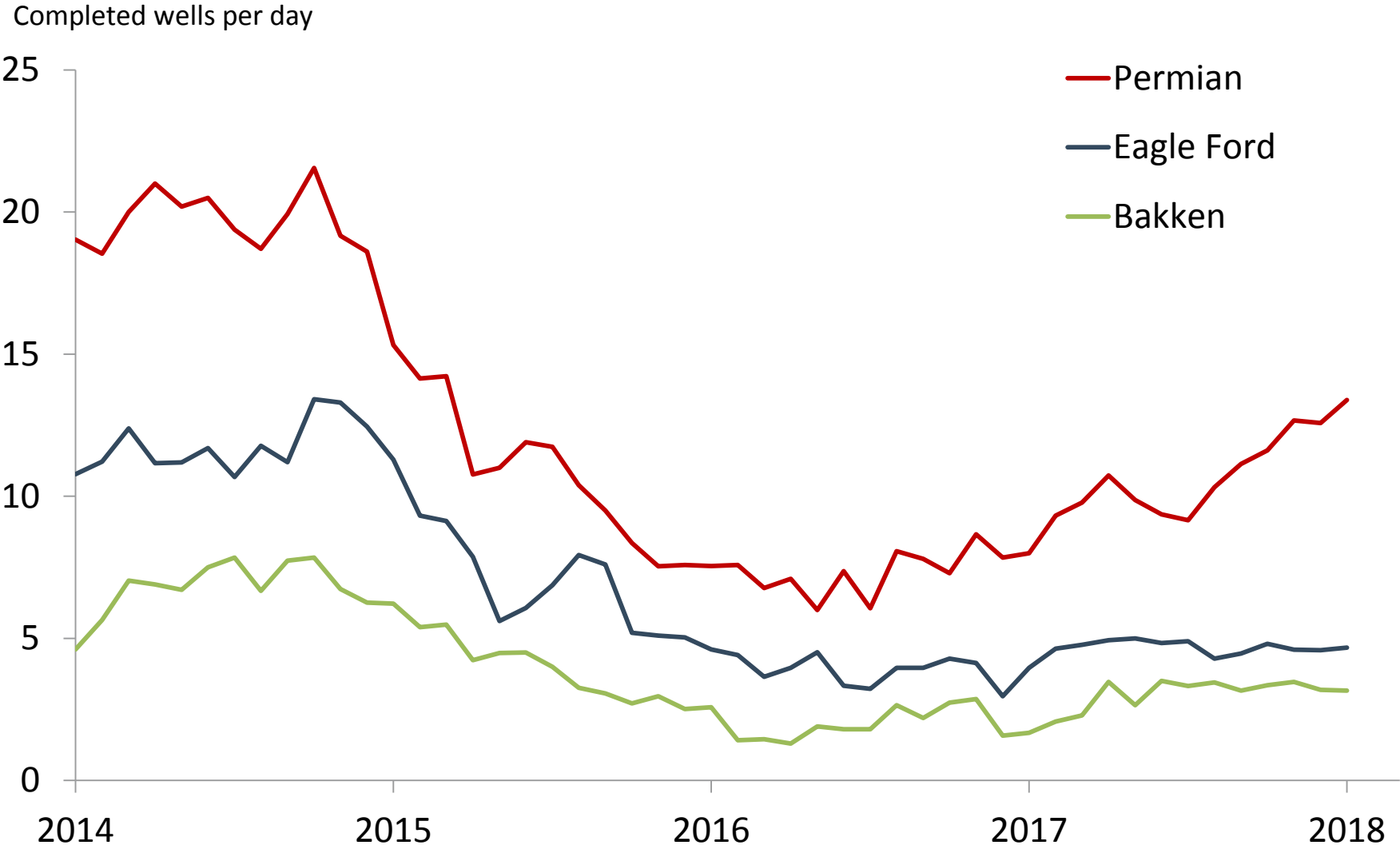
Total oil production, million barrels per day



Texas oil production continues to rise

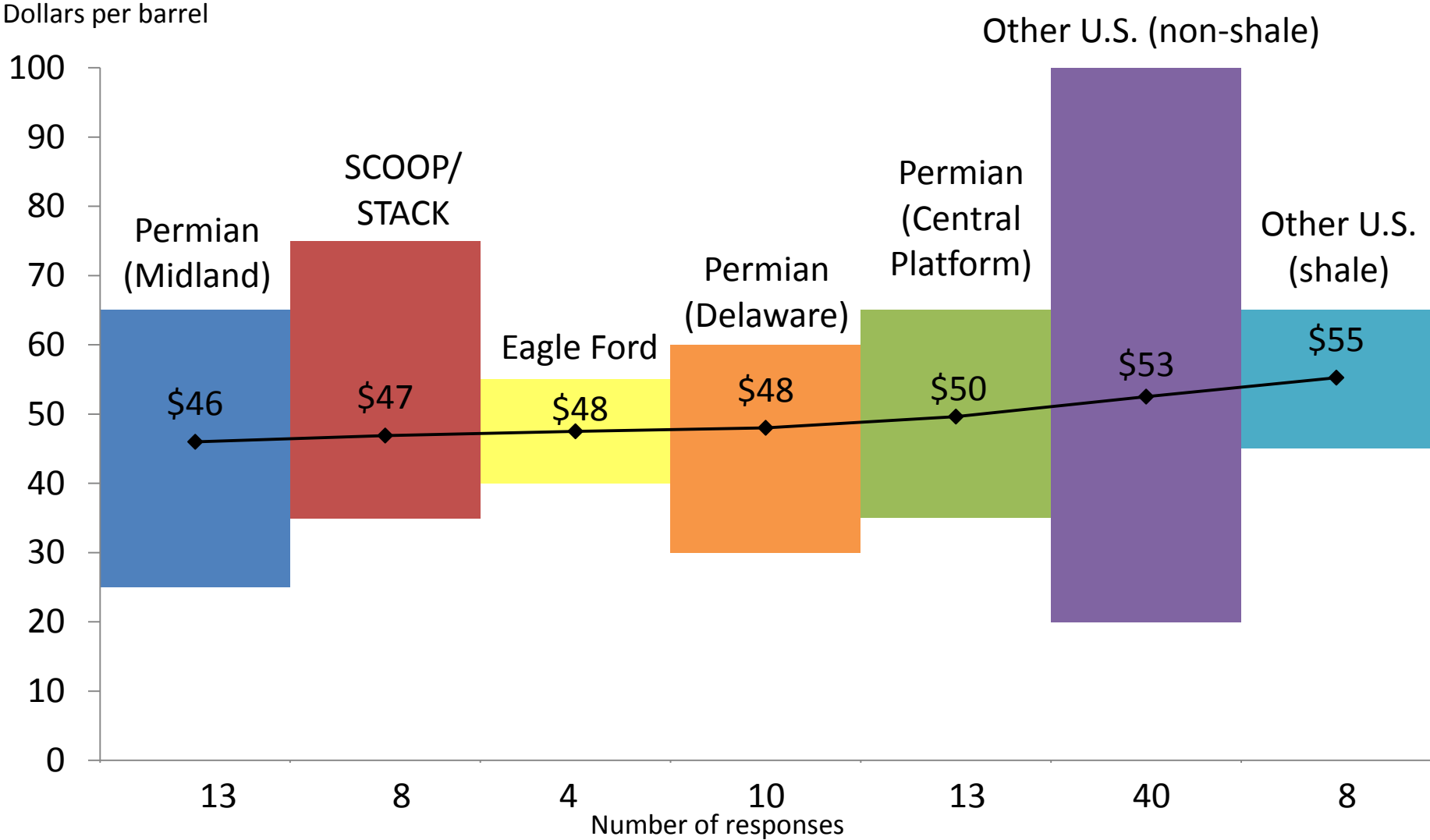


Well completions rise in the Permian



SOURCE: Energy Information Administration.

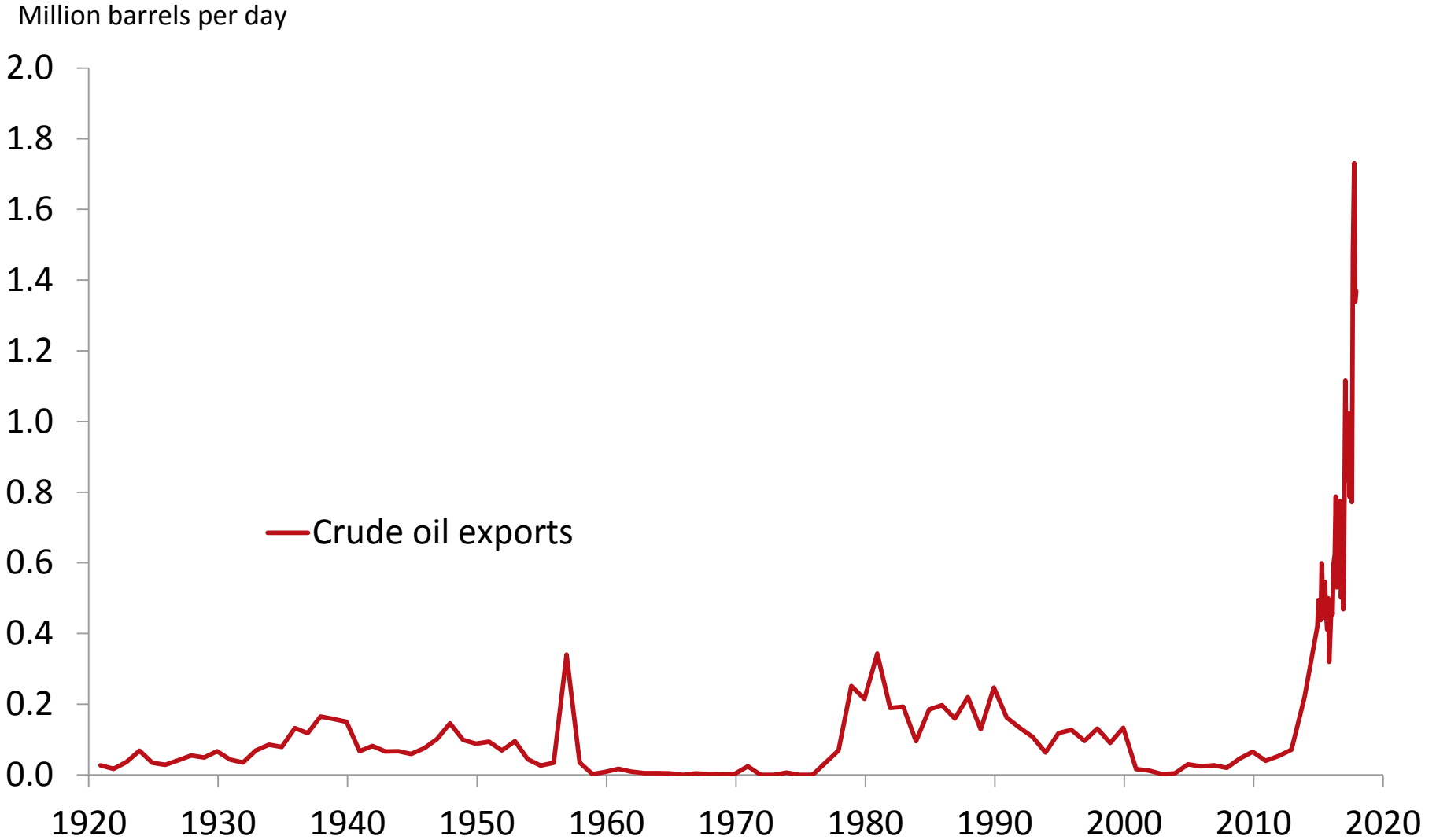
Breakeven prices for new wells



NOTES: Line shows the mean, and bars show the range of responses; 62 E&P firms answered this question from March 15-23, 2017.
 SOURCE: Federal Reserve Bank of Dallas.

Oil and Natural Gas Exports

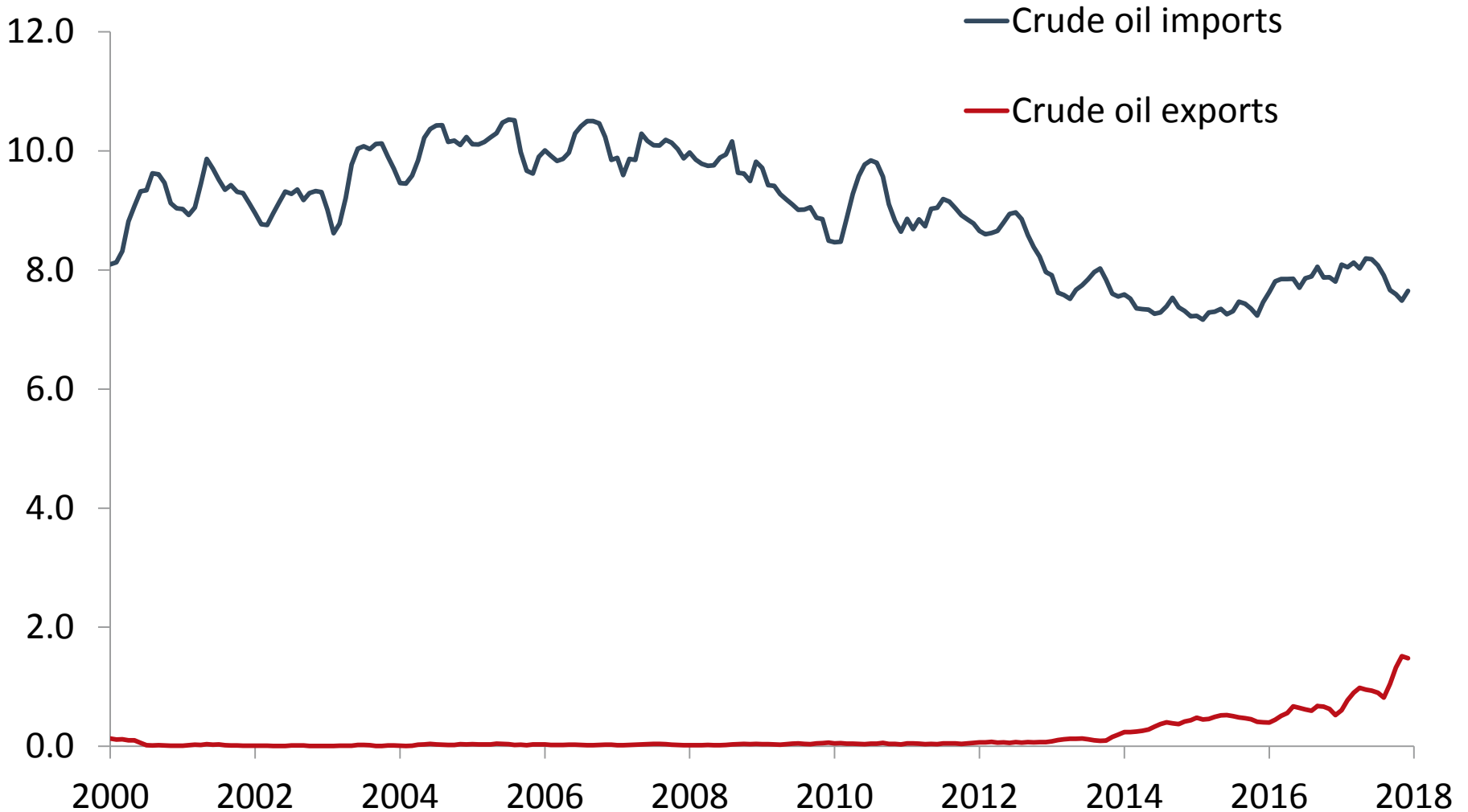
U.S. crude exports surge after lifting of export ban



SOURCE: Energy Information Administration.

U.S. Crude Imports and Exports

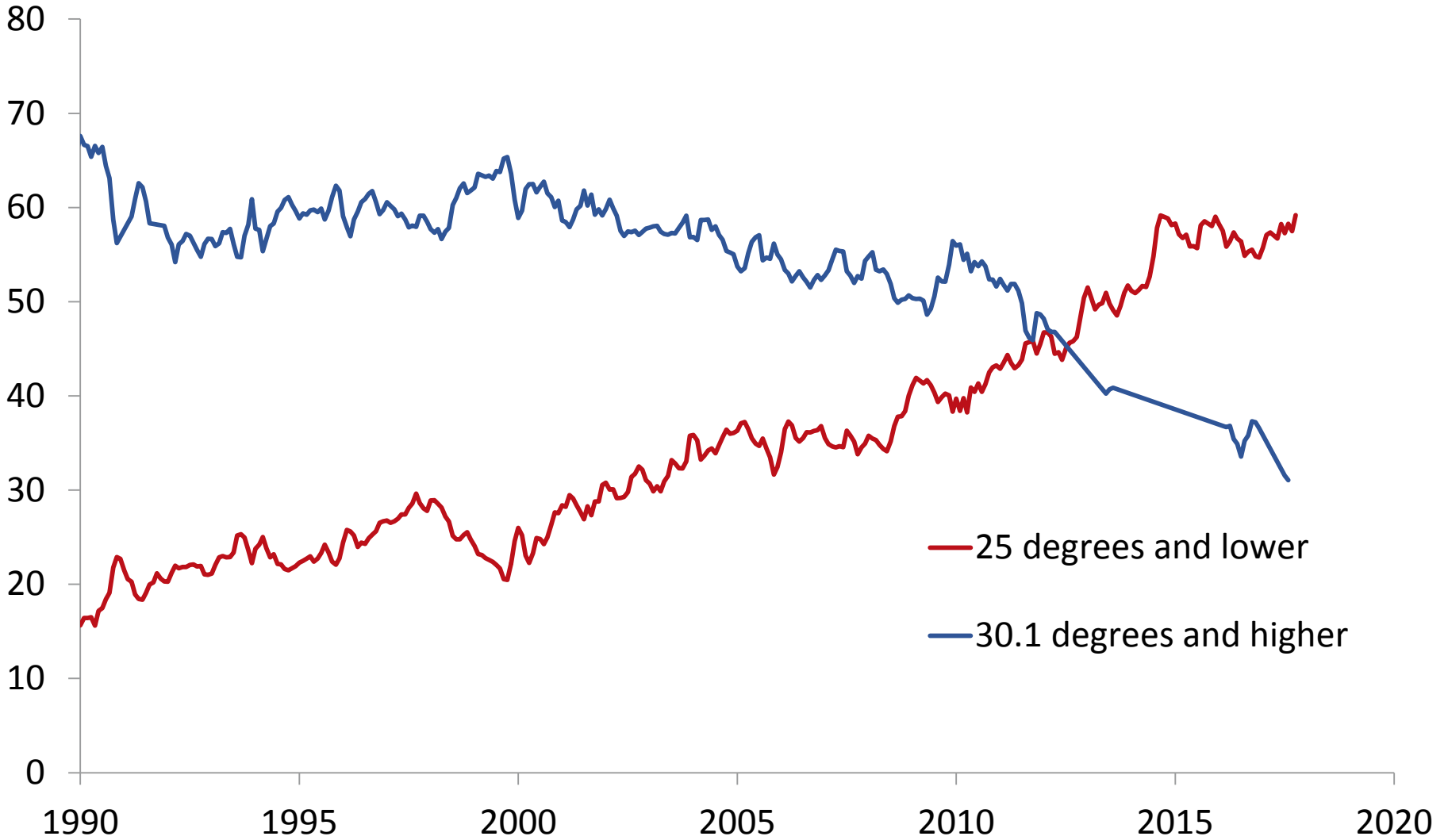
Million barrels per day, 3MMA



SOURCE: Energy Information Administration.

Imports by API Gravity

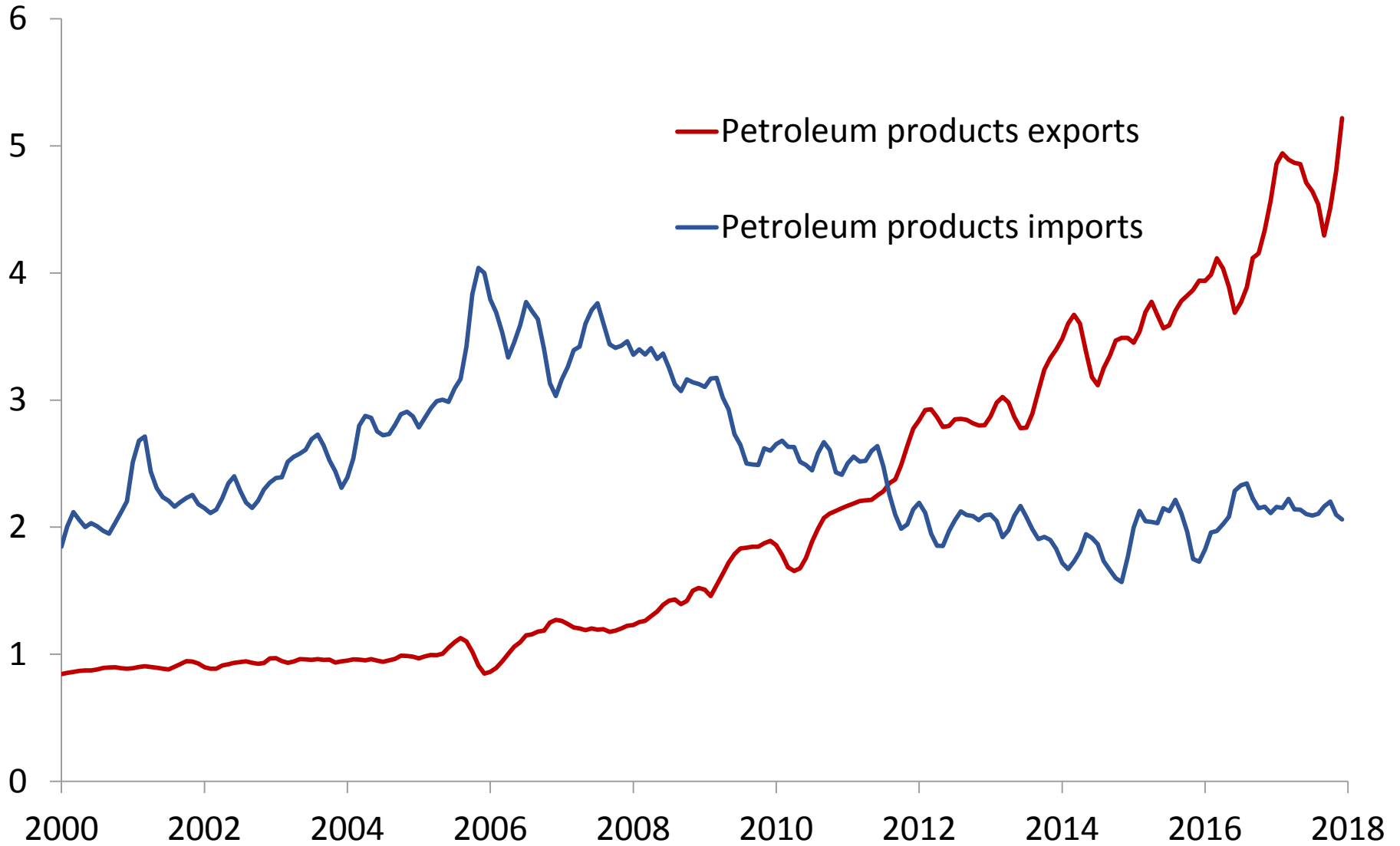
Percent, 3MMA



— 25 degrees and lower
— 30.1 degrees and higher

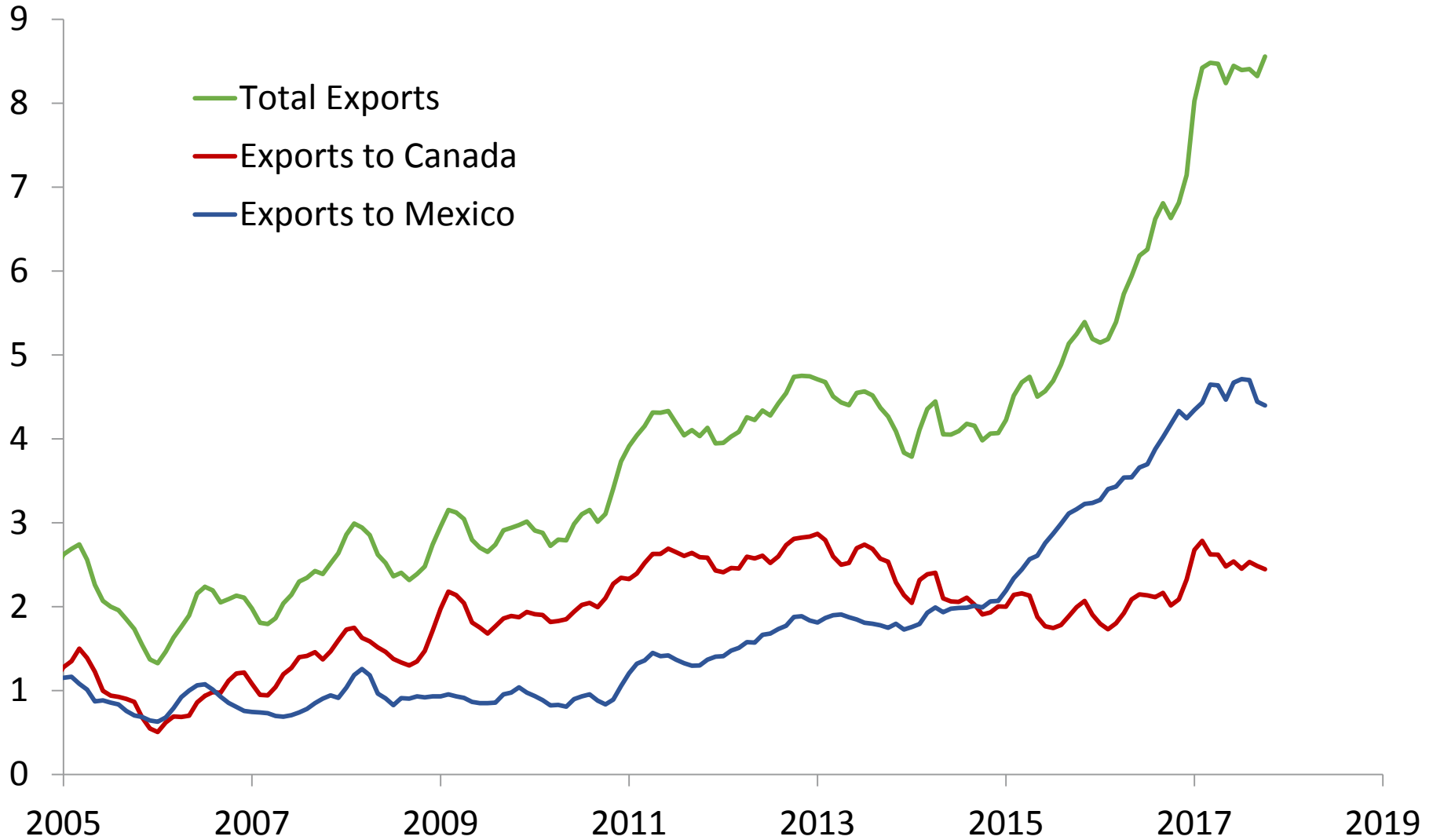
U.S. Total Product Imports and Exports

Million barrels per day, 3MMA



Bulk of U.S. natural gas exports go to Canada and Mexico

Billion cubic feet per day, SA 3MMA

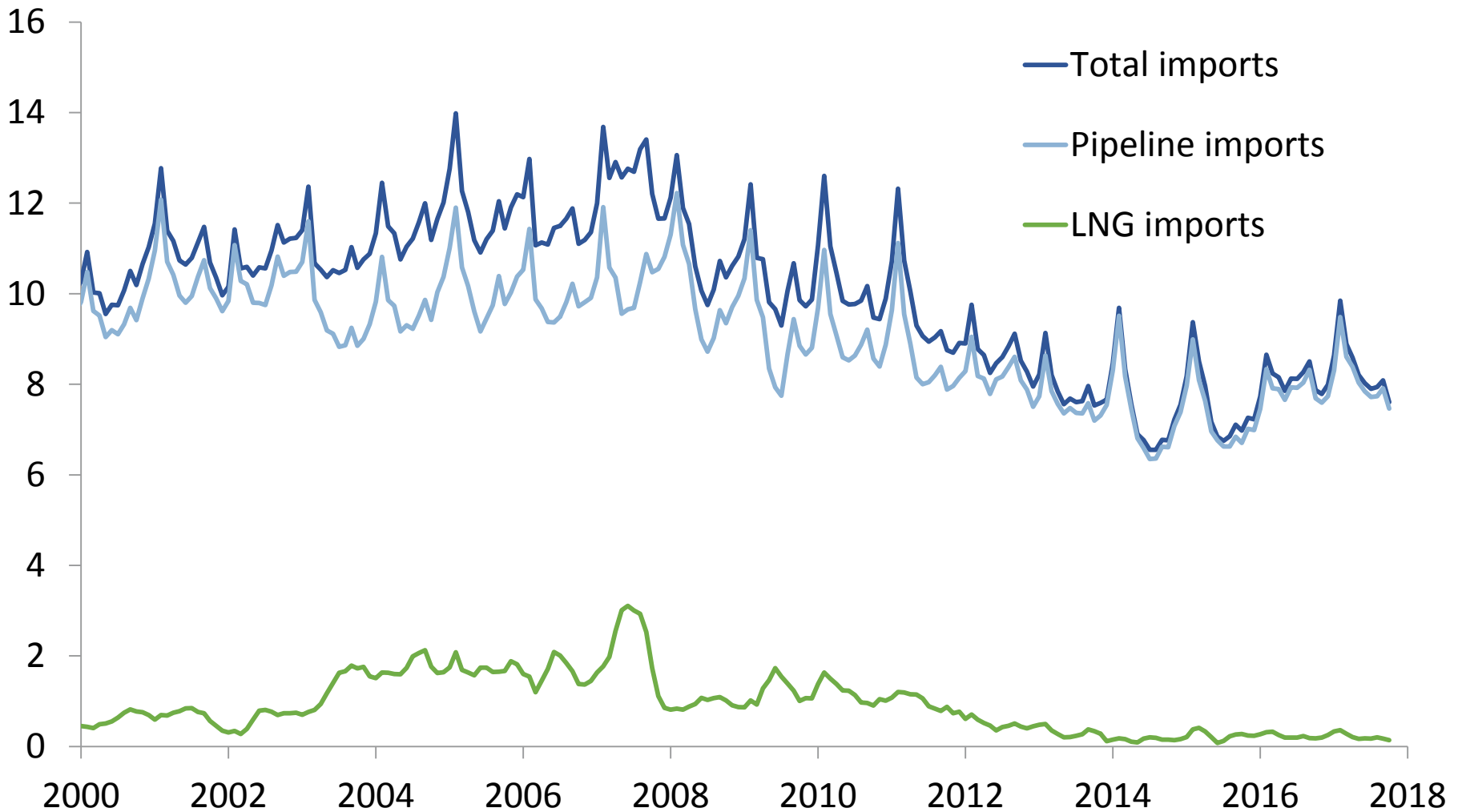


NOTES: Exports to Mexico comprises pipeline and LNG exports; exports to Canada comprises pipeline, LNG and CNG exports.

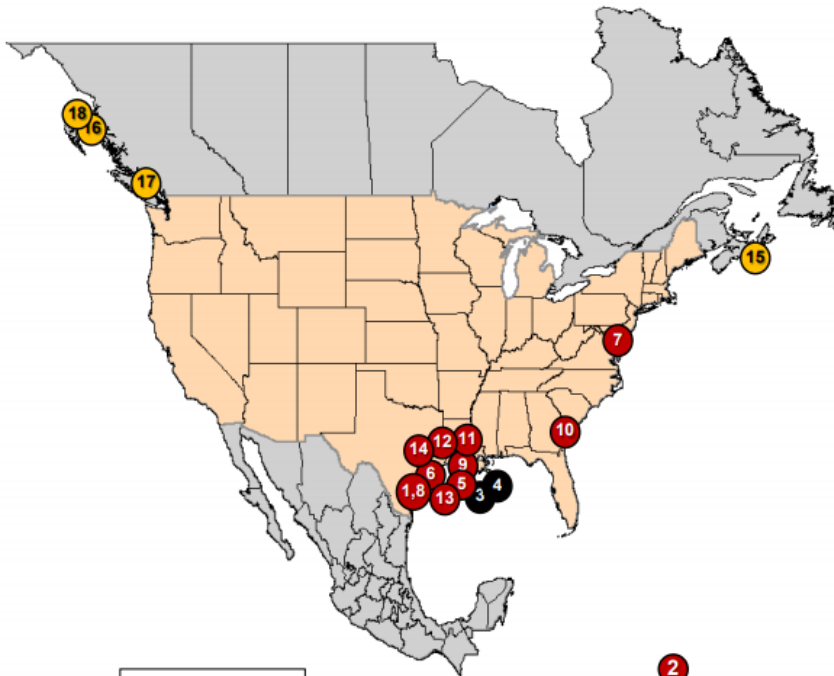
SOURCE: Energy Information Administration.

U.S. natural gas imports mostly by pipeline

Billion cubic feet per day, 3MMA



North American LNG Import/Export Terminals *Approved*



US Jurisdiction
 ● FERC
 ● MARAD/USCG

As of January 24, 2018

Import Terminals

U.S.

APPROVED - UNDER CONSTRUCTION - FERC

1. Corpus Christi, TX: 0.4 Bcfd (Cheniere – Corpus Christi LNG) (CP12-507)

APPROVED – NOT UNDER CONSTRUCTION - FERC

2. Salinas, PR: 0.6 Bcfd (Aguirre Offshore GasPort, LLC) (CP13-193)

APPROVED - NOT UNDER CONSTRUCTION - MARAD/Coast Guard

3. Gulf of Mexico: 1.0 Bcfd (Main Pass McMoRan Exp.)
 4. Gulf of Mexico: 1.4 Bcfd (TORP Technology-Bienville LNG)

Export Terminals

U.S.

APPROVED - UNDER CONSTRUCTION - FERC

5. Hackberry, LA: 2.1 Bcfd (Sempra–Cameron LNG) (CP13-25)
 6. Freeport, TX: 2.14 Bcfd (Freeport LNG Dev/Freeport LNG Expansion/FLNG Liquefaction) (CP12-509) (CP15-518)
 7. Cove Point, MD: 0.82 Bcfd (Dominion–Cove Point LNG) (CP13-113)
 8. Corpus Christi, TX: 2.14 Bcfd (Cheniere – Corpus Christi LNG) (CP12-507)
 9. Sabine Pass, LA: 1.40 Bcfd (Sabine Pass Liquefaction) (CP13-552)
 10. Elba Island, GA: 0.35 Bcfd (Southern LNG Company) (CP14-103) ★

APPROVED – NOT UNDER CONSTRUCTION - FERC

11. Lake Charles, LA: 2.2 Bcfd (Southern Union – Lake Charles LNG) (CP14-120)
 12. Lake Charles, LA: 1.08 Bcfd (Magnolia LNG) (CP14-347)
 13. Hackberry, LA: 1.41 Bcfd (Sempra - Cameron LNG) (CP15-560)
 14. Sabine Pass, TX: 2.1 Bcfd (ExxonMobil – Golden Pass) (CP14-517)

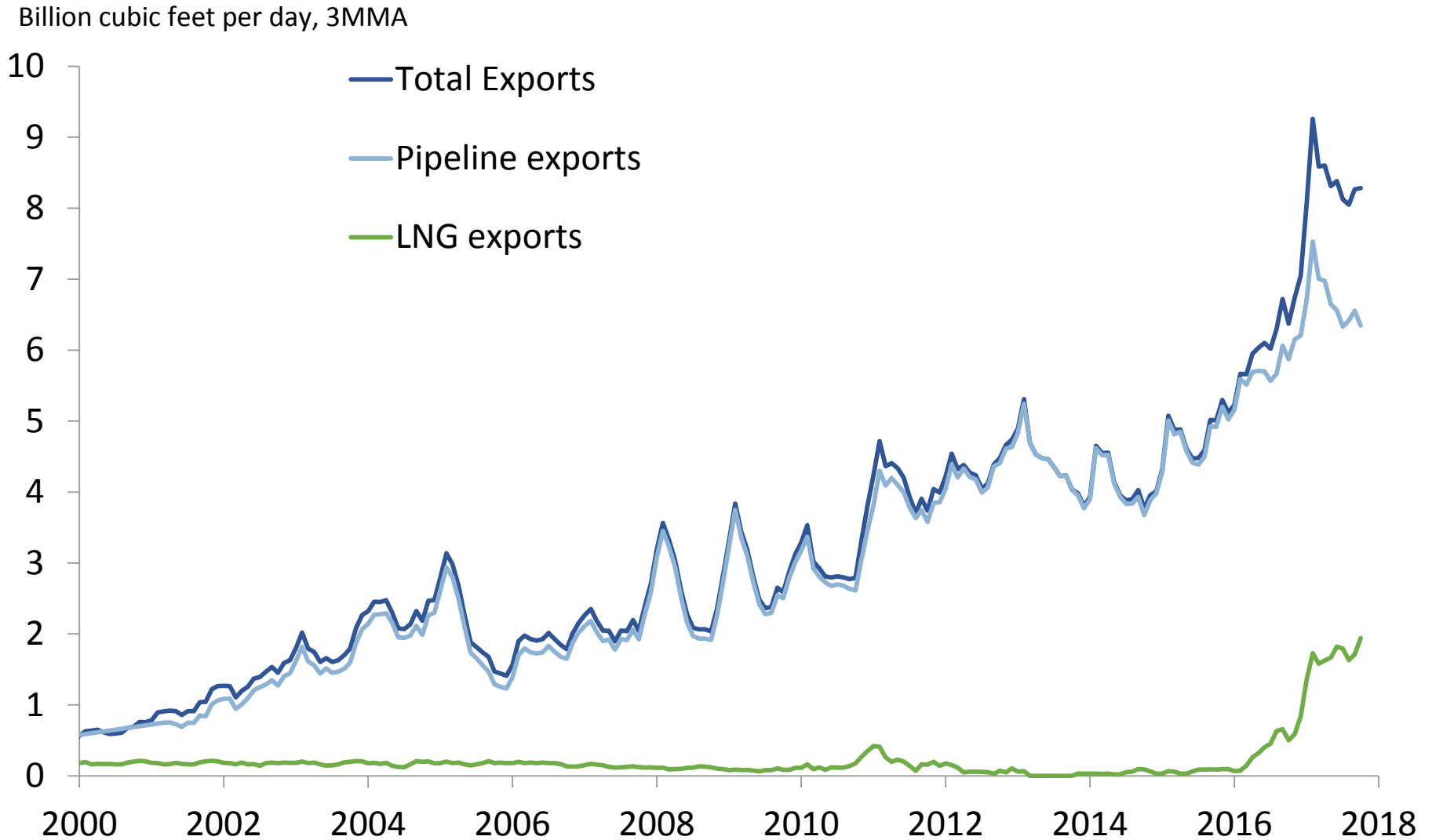
Canada

APPROVED – NOT UNDER CONSTRUCTION

15. Port Hawkesbury, NS: 0.5 Bcfd (Bear Head LNG)
 16. Kitimat, BC: 3.23 Bcfd (LNG Canada)
 17. Squamish, BC: 0.29 Bcfd (Woodfibre LNG Ltd)
 18. Prince Rupert Island, BC: 2.74 Bcfd (Pacific Northwest LNG)

★ Trains 5 & 6 with Train 5 under construction

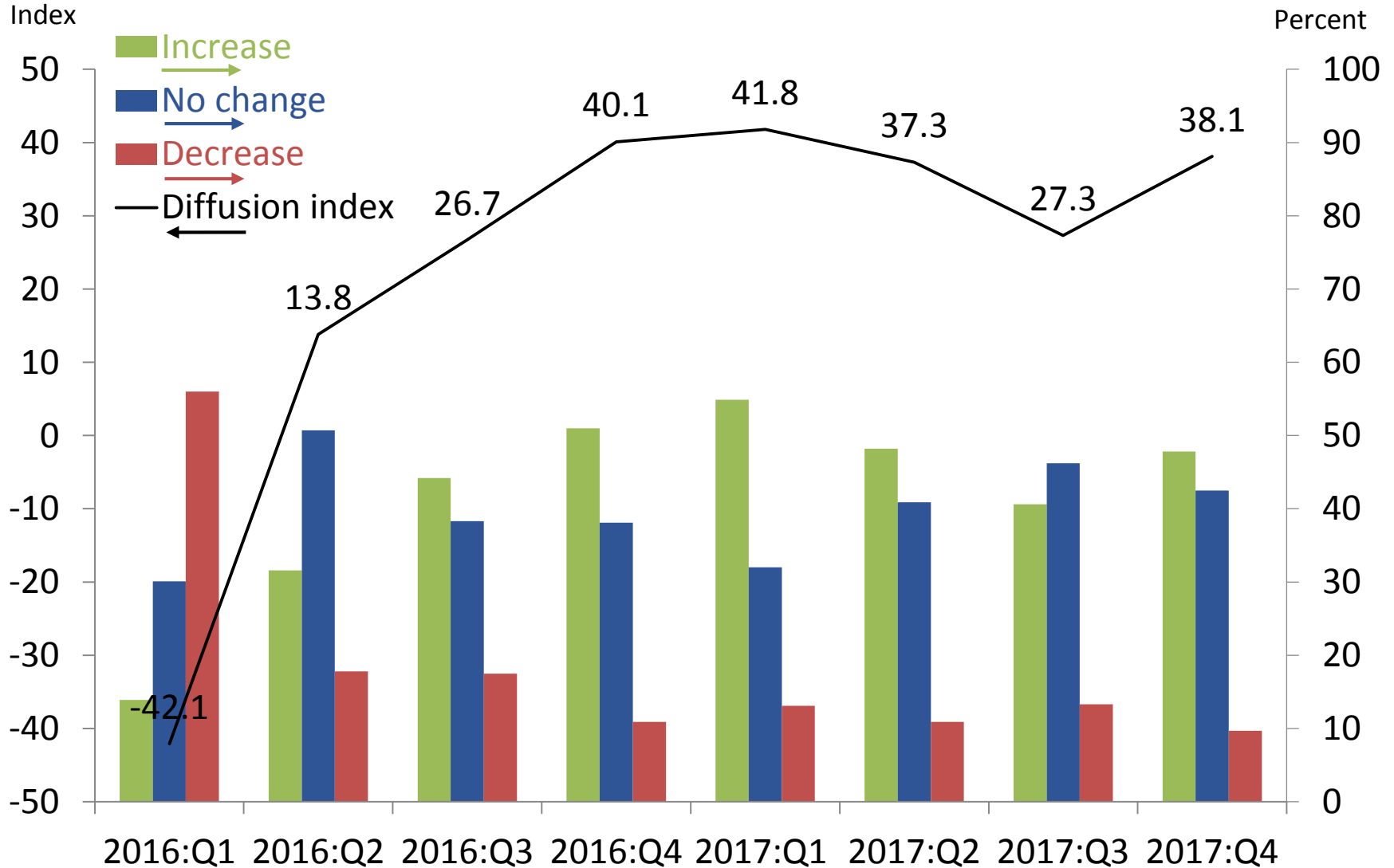
U.S. LNG exports rising



Outlook

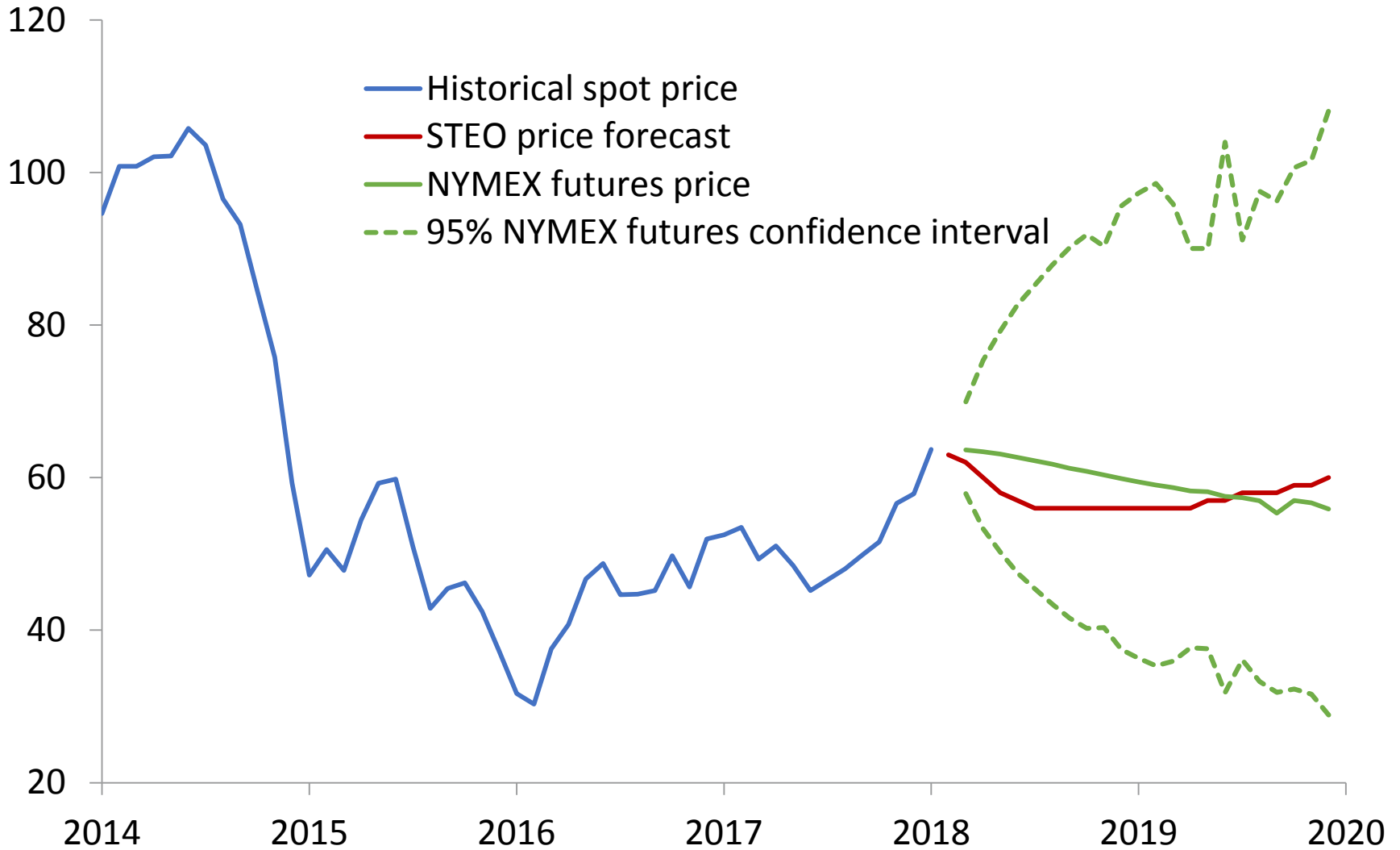
Business activity picks up in Q4 2017

Dallas Fed Energy Survey



Crude Price Forecasts

WTI crude oil, dollars per barrel



NOTE: Prices as of 2/9/2018.

SOURCES: Bloomberg; Energy Information Administration.

Outlook

- Uncertainty abounds
- Market and contacts expect oil prices in the \$50 – \$60 range in 2018.
 - Downside risks: higher shale growth, break-up of OPEC agreement, output growth in Libya, Brazil
 - Upside risks: global growth, Iran sanctions, Middle East geopolitics, faster decline in Venezuela
- U.S. exports of crude oil, oil products and natural gas rising.
- U.S. a major player in both oil and gas markets.

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