



# Mid-Stream Investment in the Era of Shale

## Kinetica Shipper Meeting

### Lake Charles, LA

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**Introduction**

**Up-Stream Historical Trends**

**Mid-Stream Infrastructure**

**Outlook**

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# Introduction

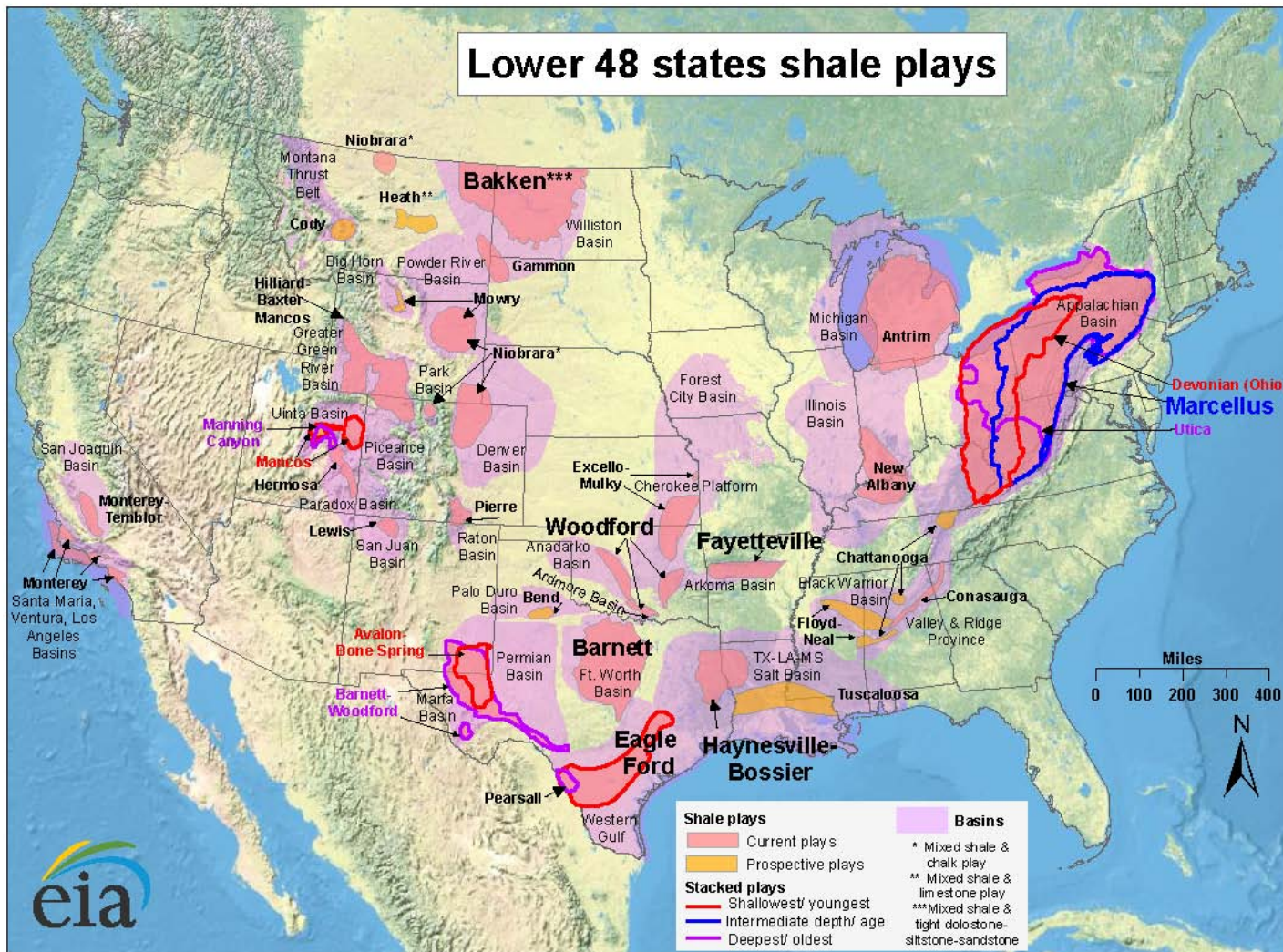
## Introduction

- The advent of shale oil and gas has fundamentally shifted the energy outlook not only here in on the U.S. Gulf Coast, but also globally.
- While Gulf Coast production of both oil and gas has increased significantly with shale, the composition of this production has changed significantly, creating potential winners and losers.
- Because resources are coming from new areas and at starkly different quantities, investment in mid-stream infrastructure has been spurred by changes in spatial price differentials.

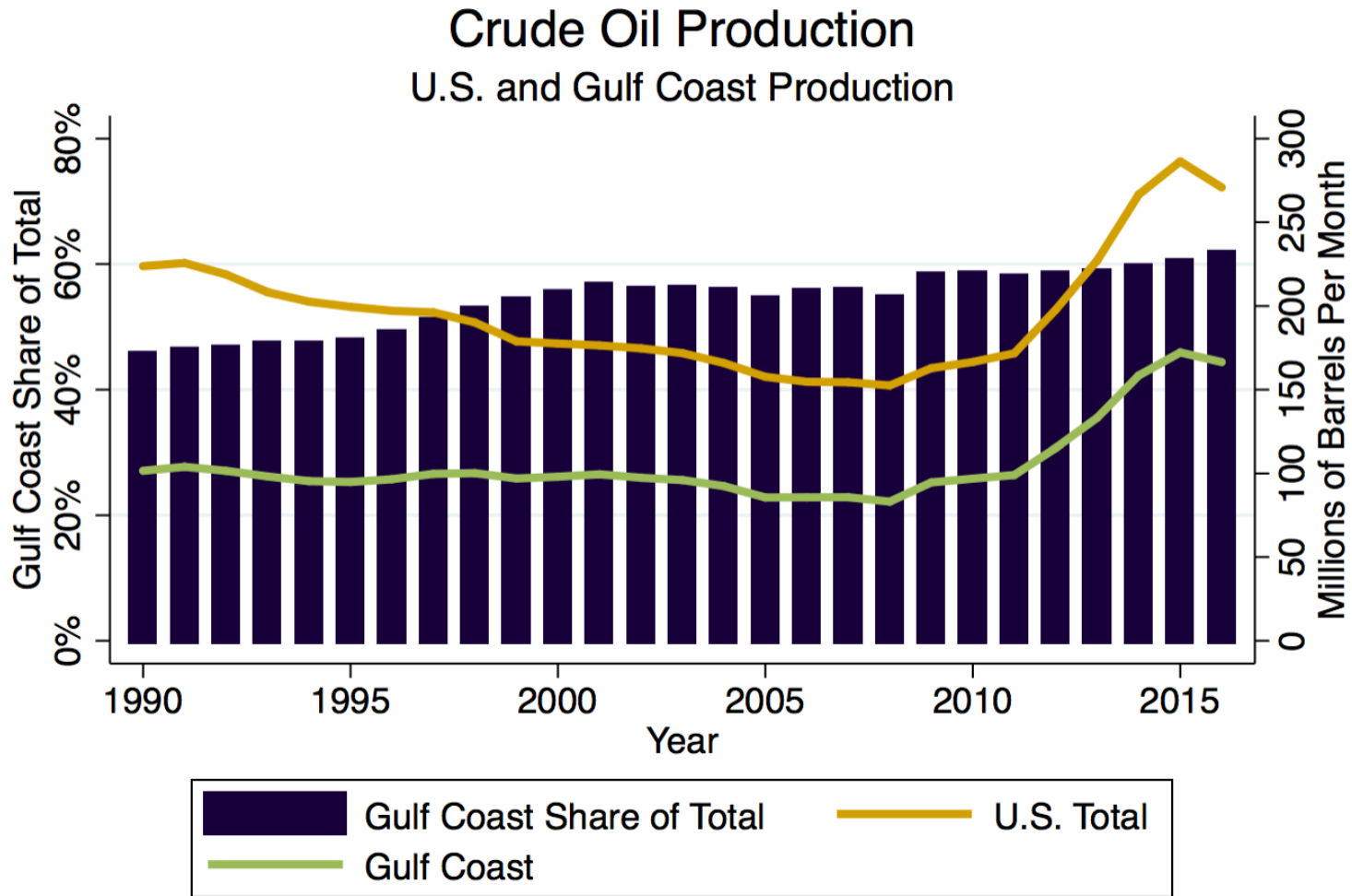
## Up-Stream Oil and Gas

**Domestic Shale Gas Basins and Plays**

**U.S. unconventional production from shale plays has unleashed a considerable level of domestic energy production. This production, however, is arising in new areas, necessitating new infrastructure in order to deliver to the market.**



Gulf Coast Crude Production

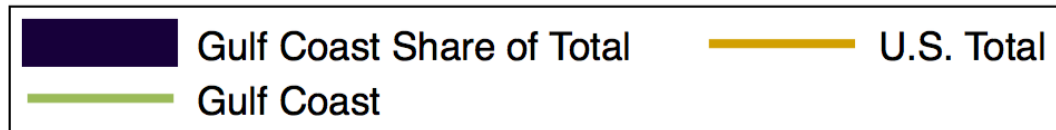
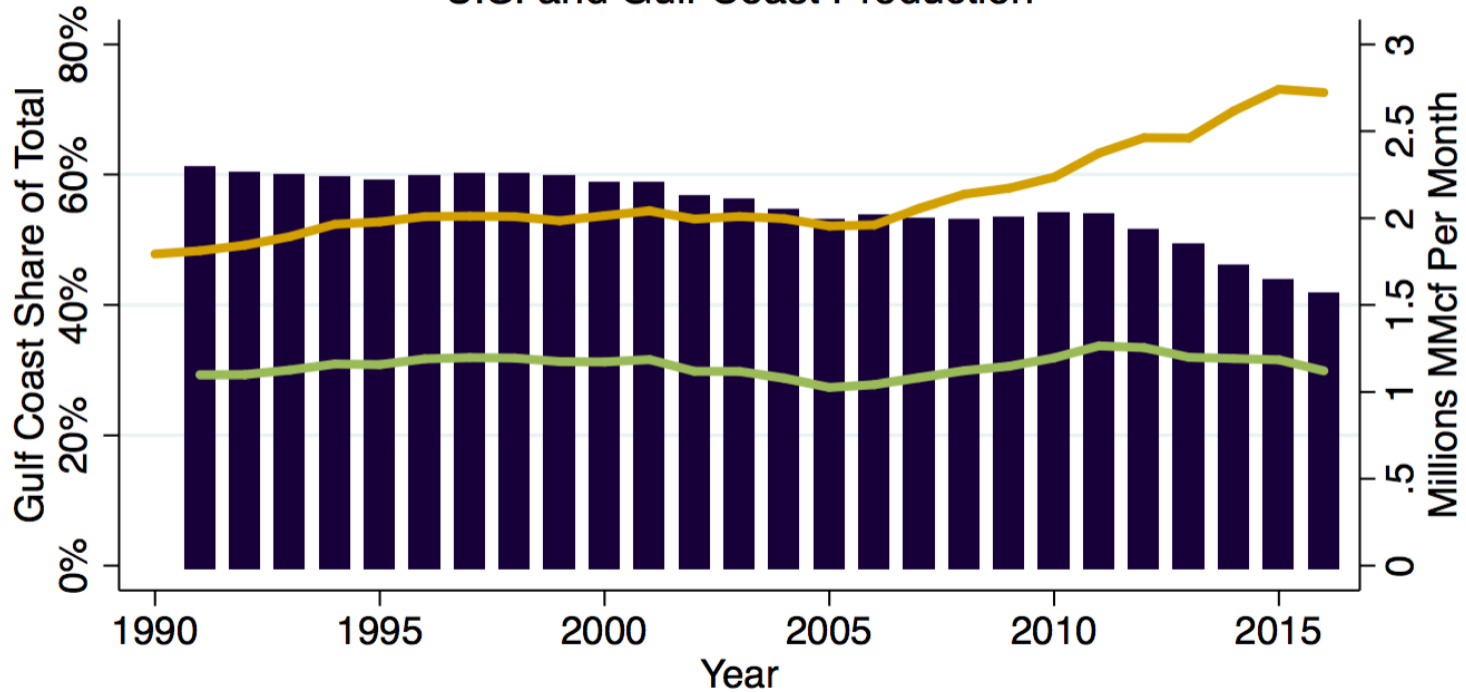


Source: EIA - Crude Oil Production (Monthly). Gulf Coast defined as PADD 3. Data only available until September 2016, therefore average production in January-August shown for 2016.

Gulf Coast Crude Production

Natural Gas Production (MMcf)

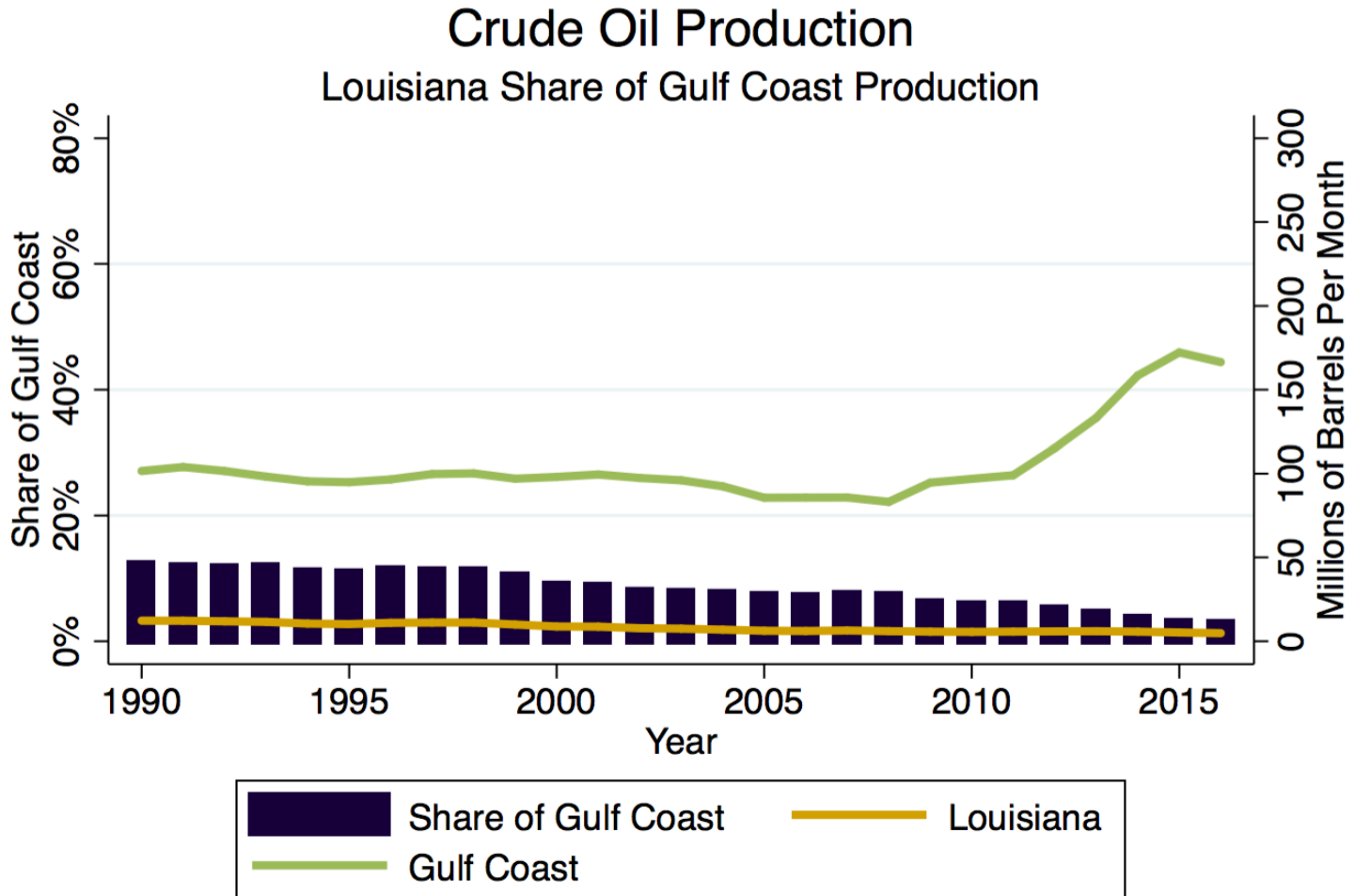
U.S. and Gulf Coast Production



Source: EIA - Natural Gas Gross Withdrawals (Monthly). Gulf Coast defined as PADD 3. Data only available until September 2016, therefore average production in January-August shown for 2016. PADD 3 production data not available before 1991. Natural Gas production data not available for Alabama and Mississippi.

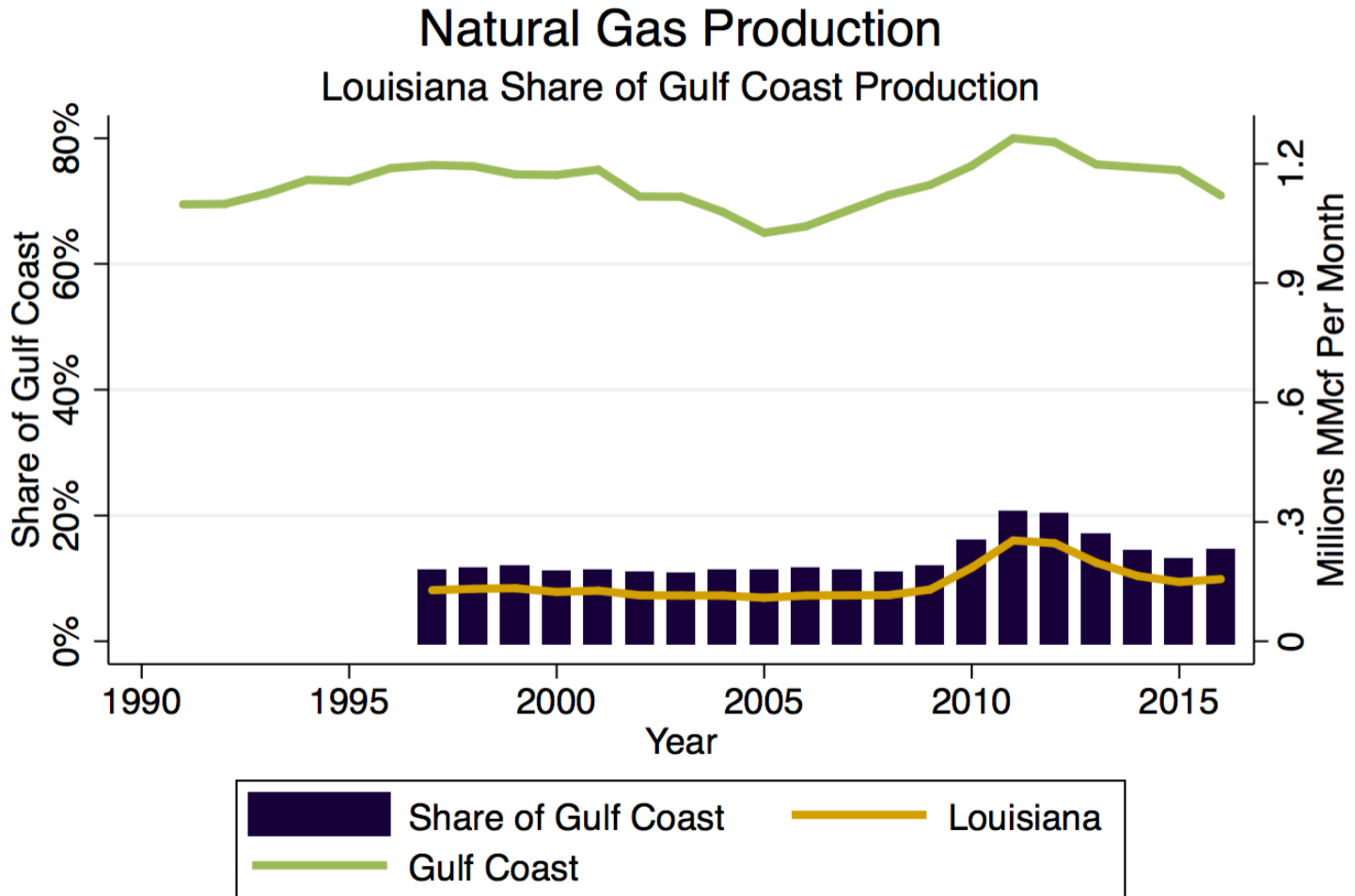


Louisiana's Share of Gulf Coast Crude Production



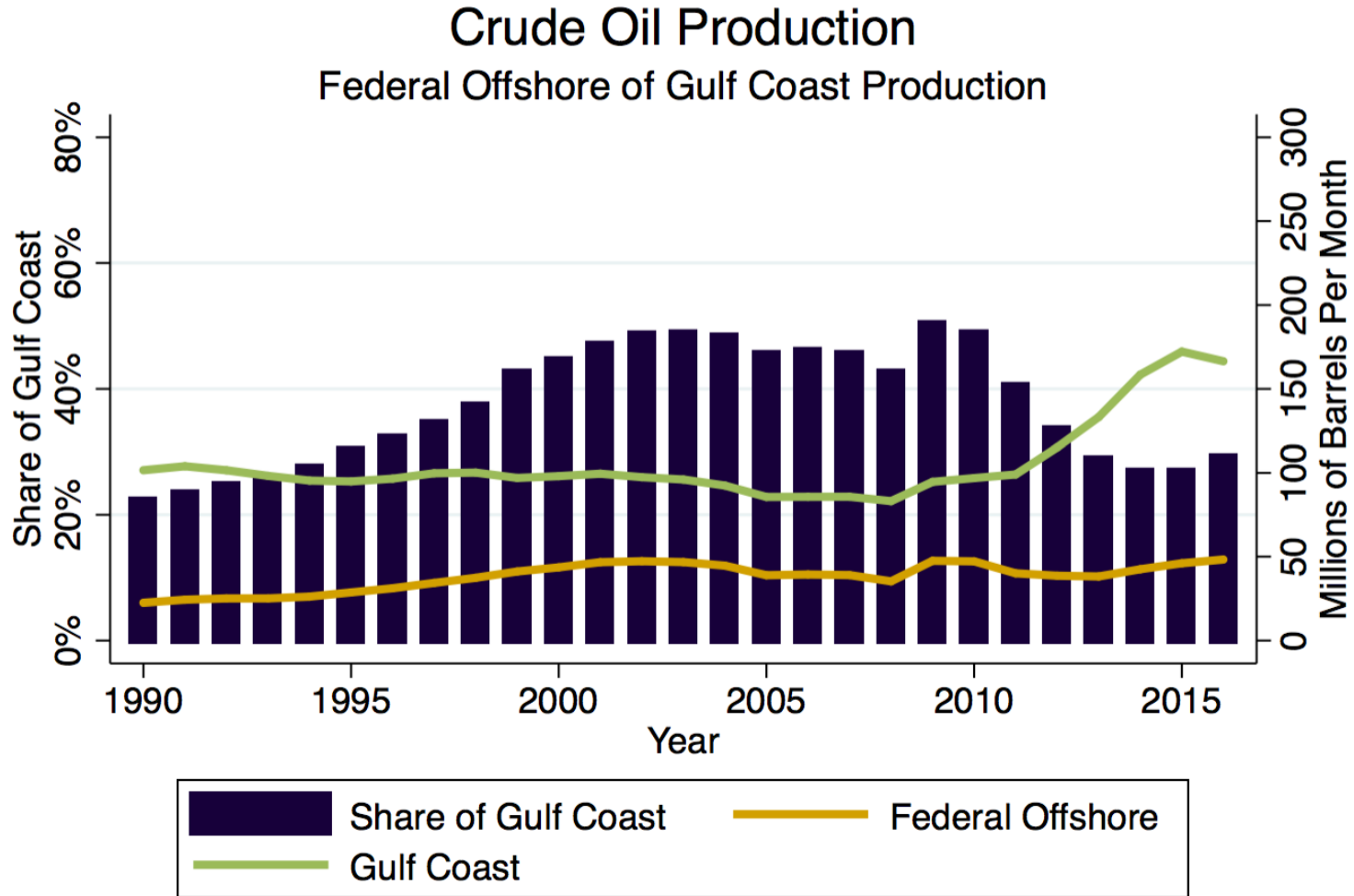
Source: EIA - Crude Oil Production (Monthly). Gulf Coast defined as PADD 3. Data only available until September 2016, therefore average production in January-August shown for 2016.

Louisiana's Share of Gulf Coast Crude Production



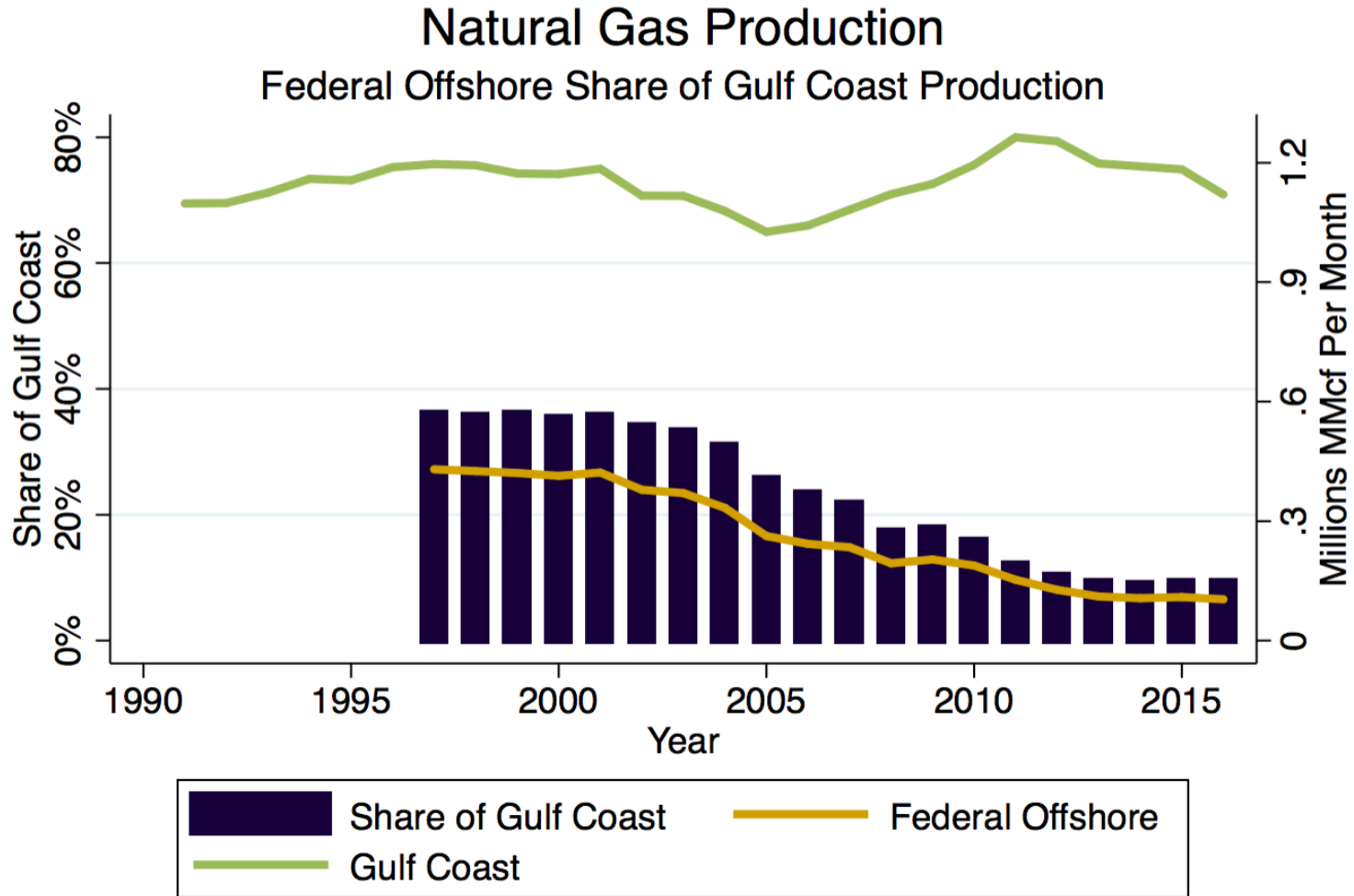
Source: EIA - Natural Gas Gross Withdrawals (Monthly). Gulf Coast defined as PADD 3. Data only available until September 2016, therefore average production in January-August shown for 2016.

OCS's Share of Gulf Coast Crude Production



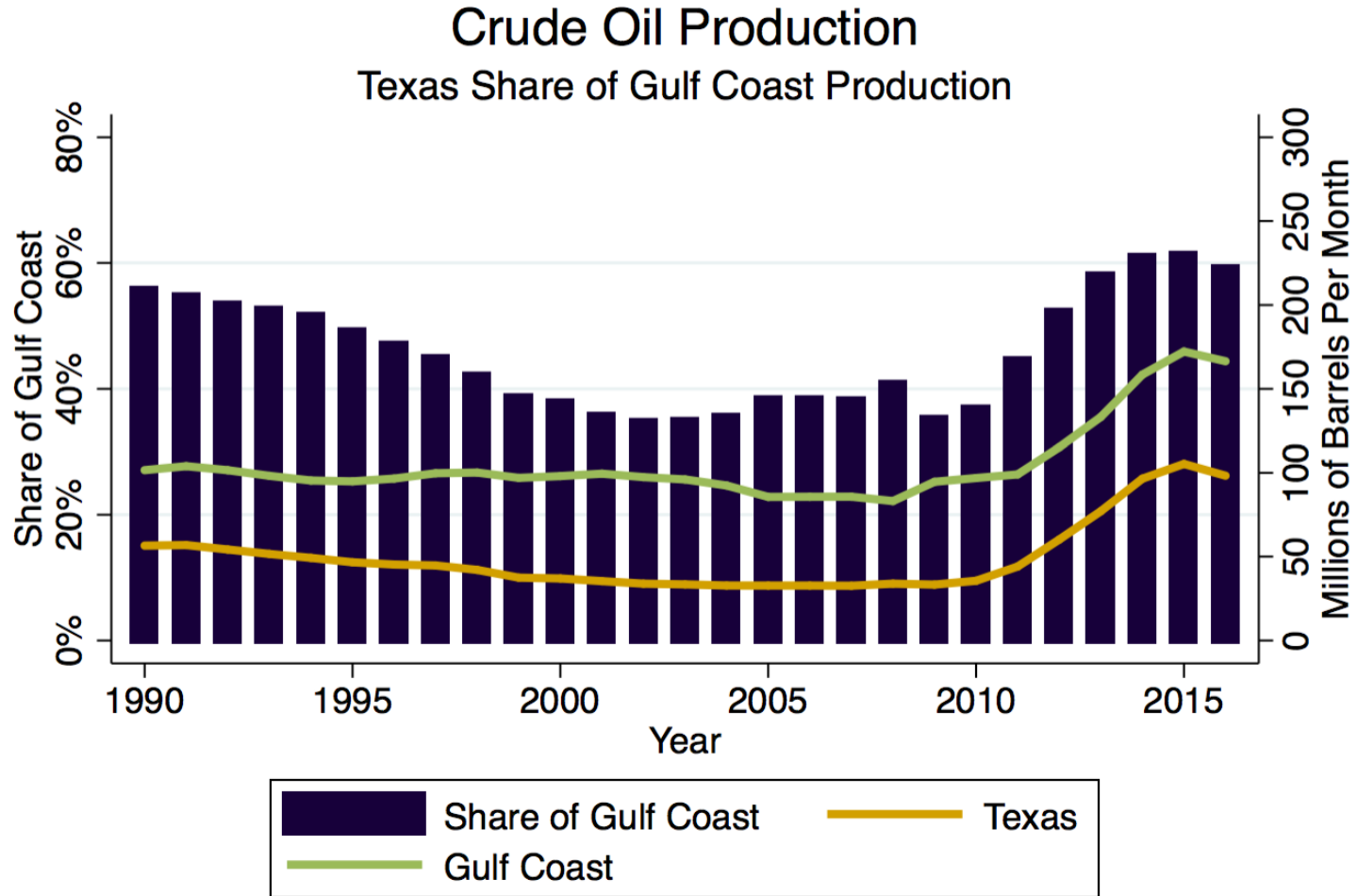
Source: EIA - Crude Oil Production (Monthly). Gulf Coast defined as PADD 3. Data only available until September 2016, therefore average production in January-August shown for 2016.

**OCS's Share of Gulf Coast Crude Production**



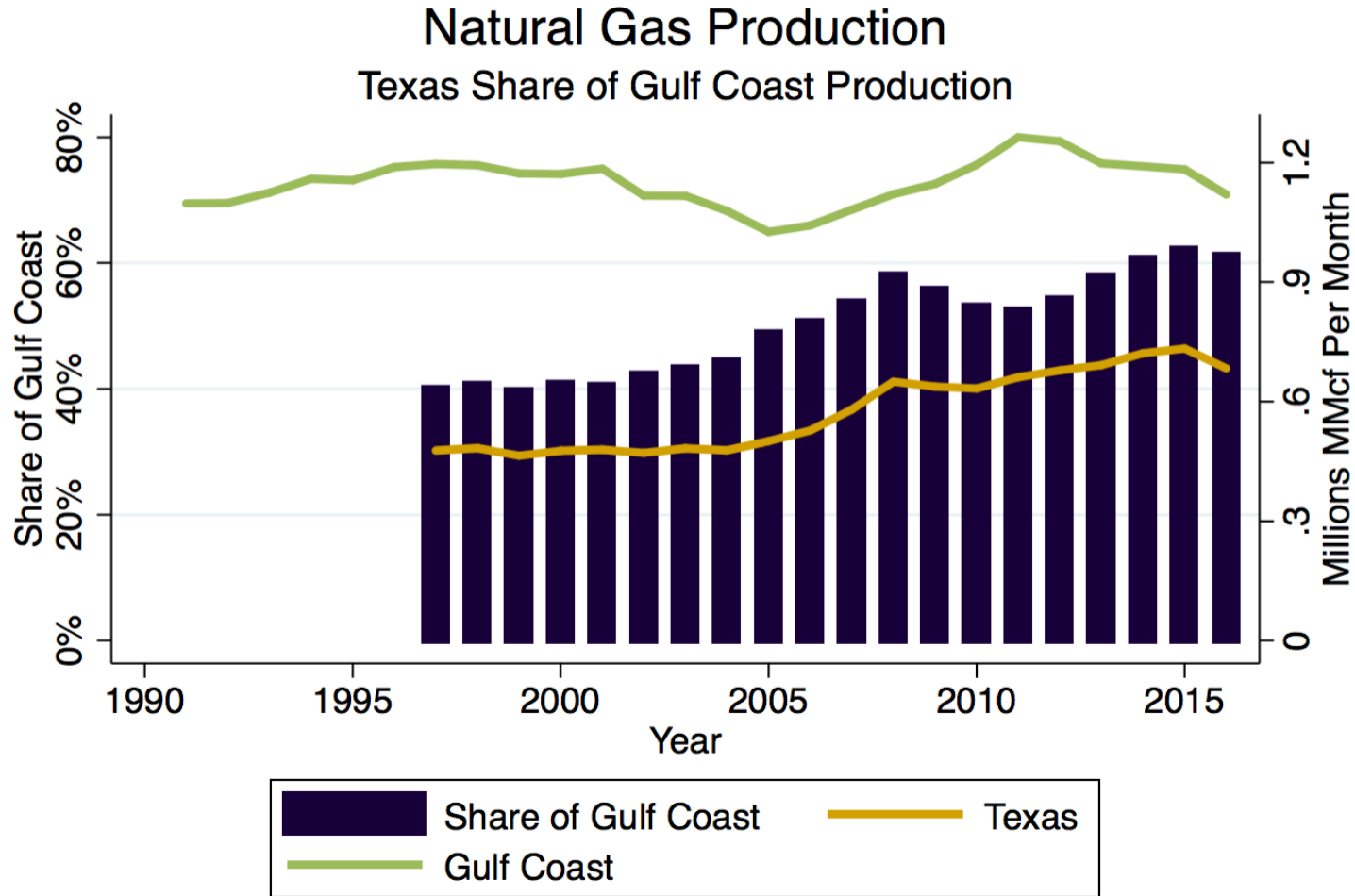
Source: EIA - Natural Gas Gross Withdrawals (Monthly). Gulf Coast defined as PADD 3. Data only available until September 2016, therefore average production in January-August shown for 2016.

Texas' Share of Gulf Coast Crude Production



Source: EIA - Crude Oil Production (Monthly). Gulf Coast defined as PADD 3. Data only available until September 2016, therefore average production in January-August shown for 2016.

Texas' Share of Gulf Coast Crude Production



Source: EIA - Natural Gas Gross Withdrawals (Monthly). Gulf Coast defined as PADD 3. Data only available until September 2016, therefore average production in January-August shown for 2016.

## Mid-Stream Infrastructure

**Examples of Recent Mid-Stream Infrastructural Investments**

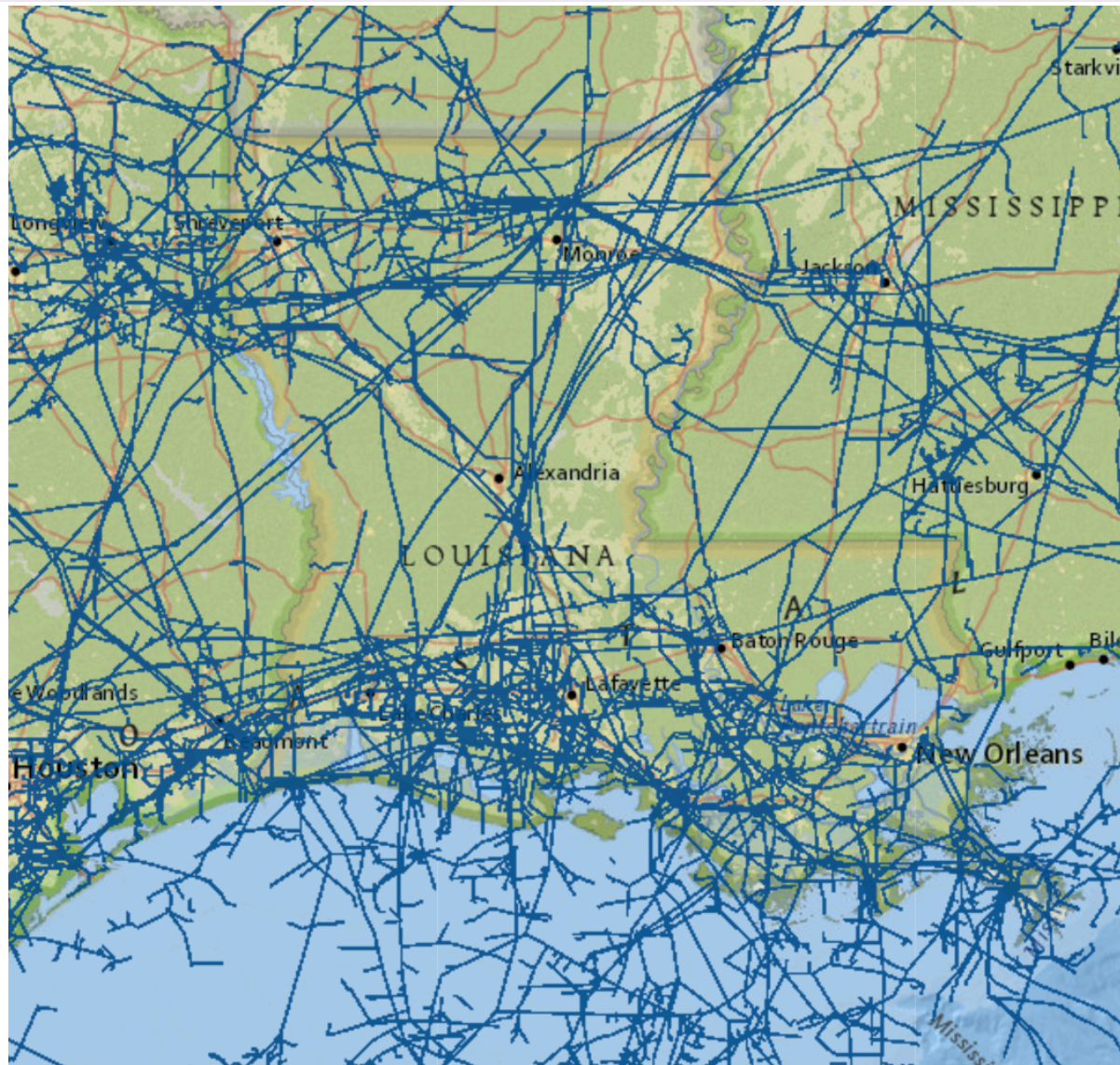
- New Pipelines
  - Keystone XL (current)
  - Dakota Access (current)
  - Bayou Bridge (current)
- Reversals/Expansions
  - Seaway (2012)
  - Longhorn (2013)
  - Houma-to-Houston (2013)
  - North Louisiana System (2015)



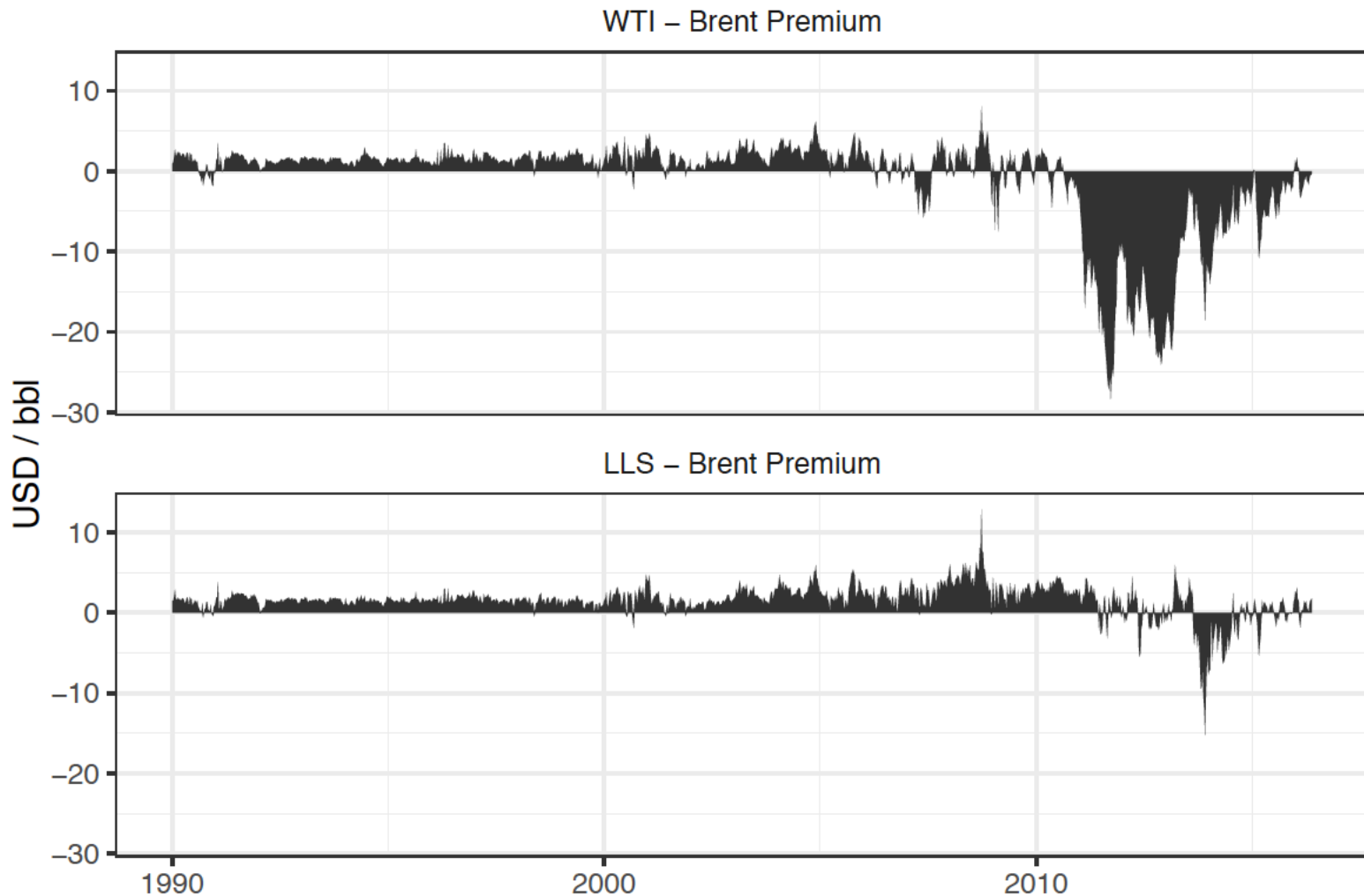
## Crude Pipelines



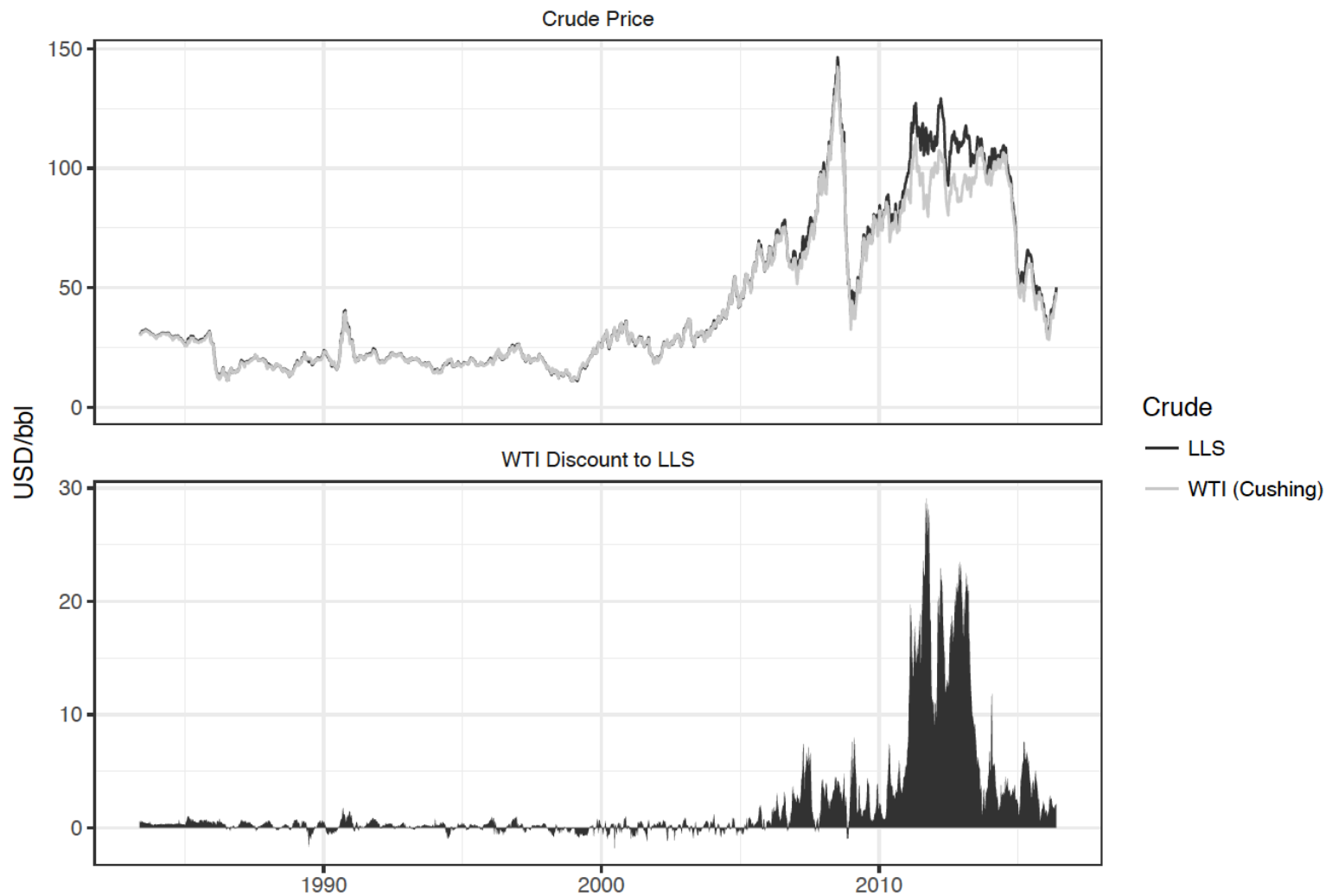
**Natural Gas Inter/Intrastate Pipelines**



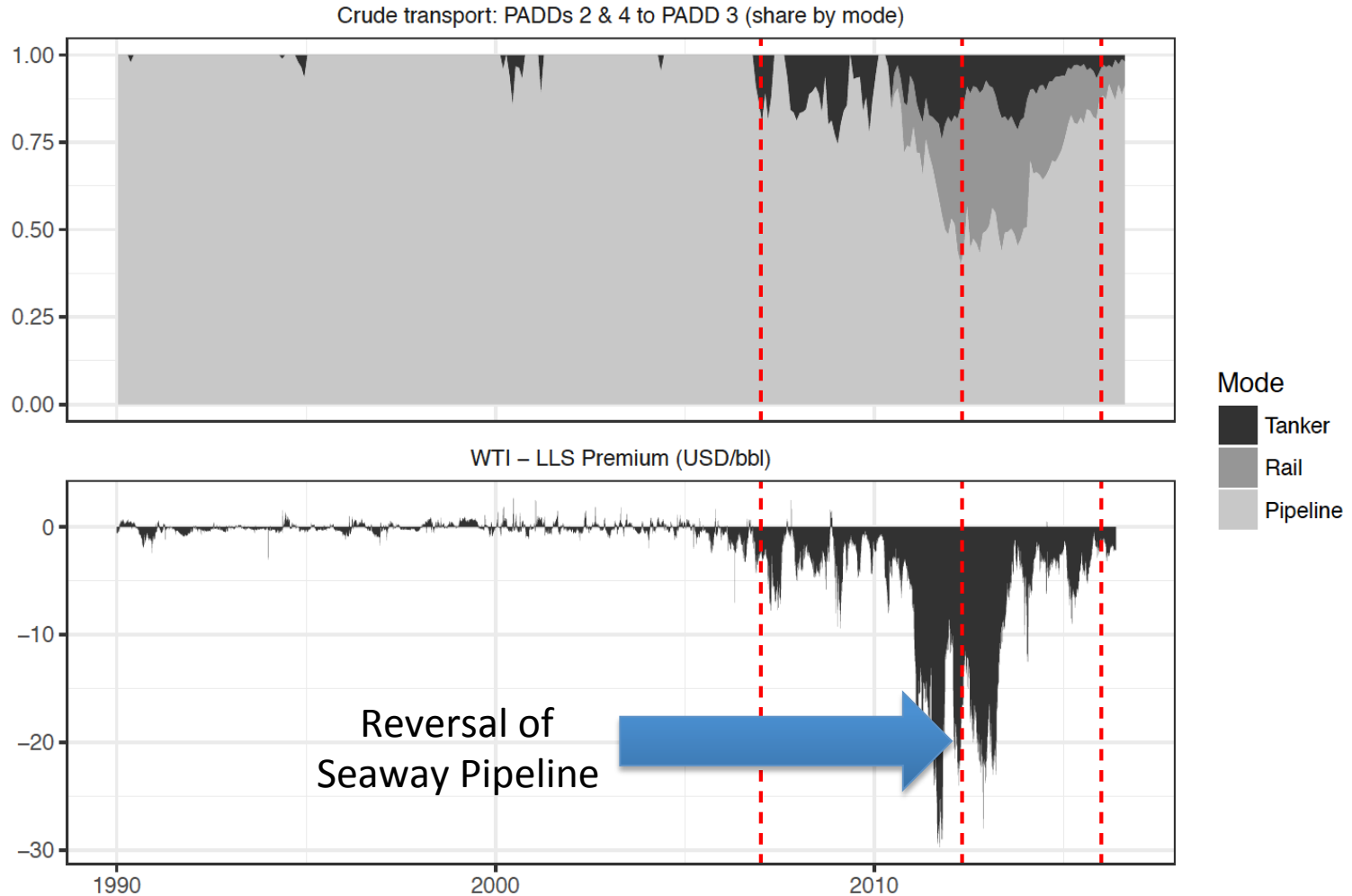
## Foreign/Domestic Price Differentials



Price Differentials Within the U.S.

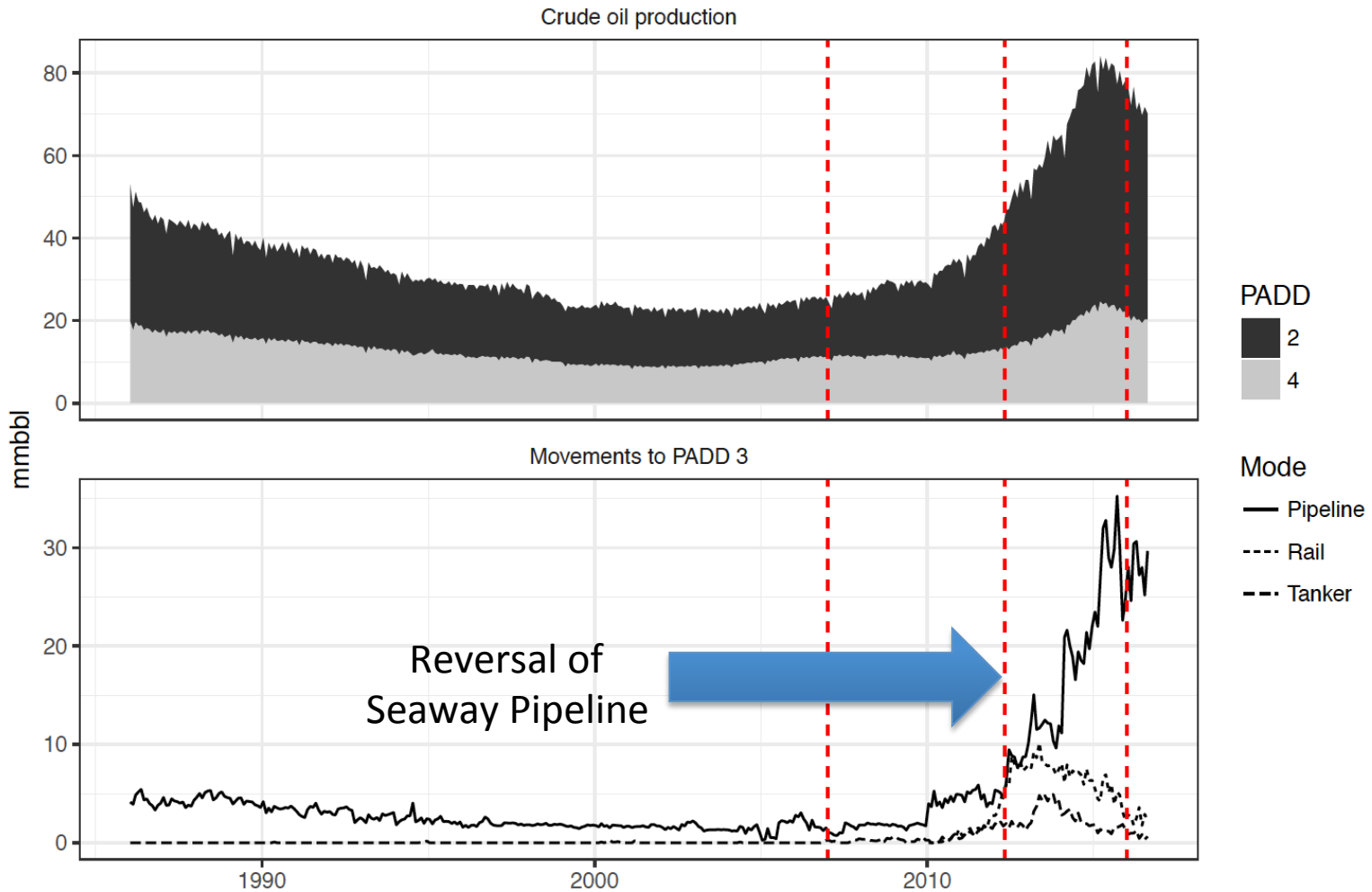


Price Differentials and Shipping Constraints



Lines at Jan 2007, May 2012, Jan 2016

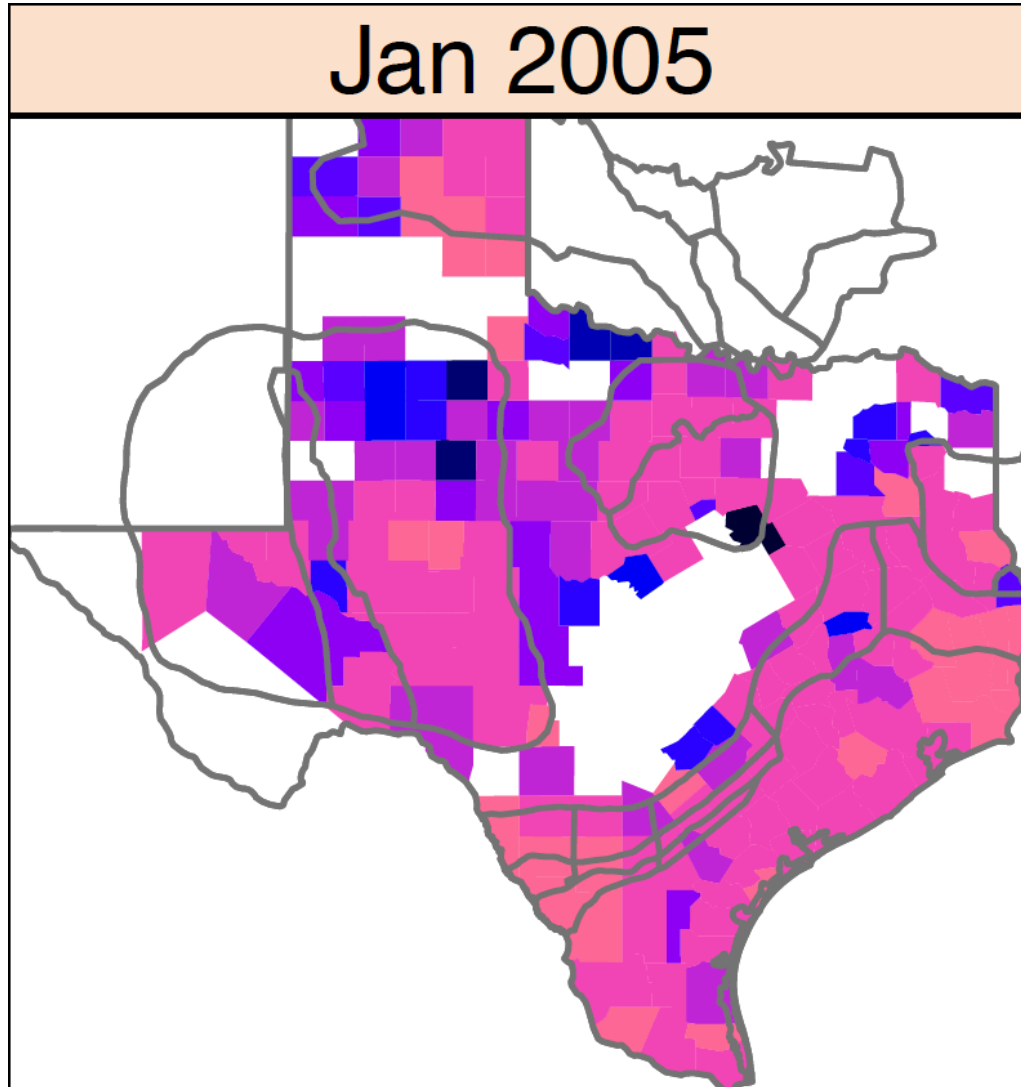
## Price Differentials and Shipping Constraints



Lines at Jan 2007, May 2012, Jan 2016

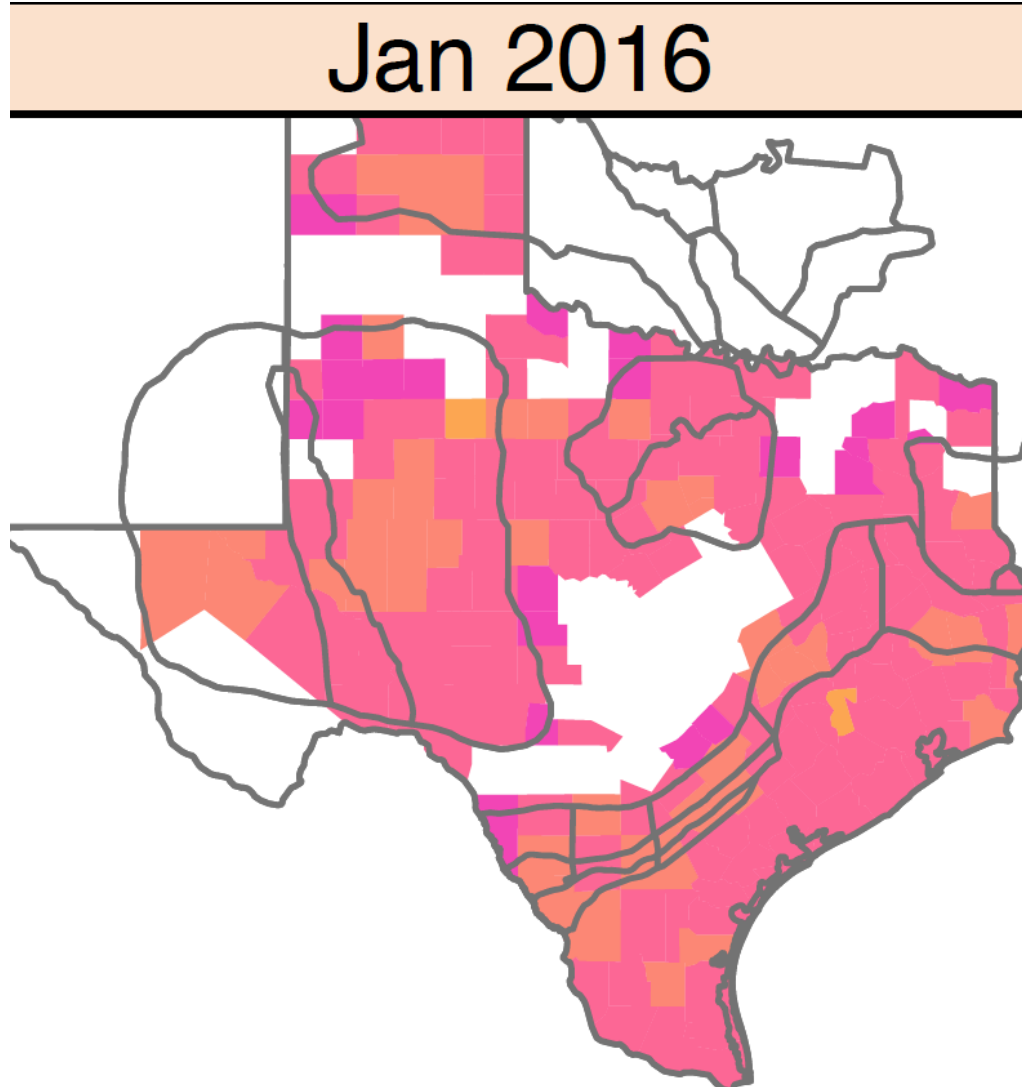
**Natural Gas Price Premium to HH**

**During the peak of the natural gas boom, natural gas wellhead prices in west Texas were discounted heavily to Henry Hub.**



**Natural Gas Price Premium to HH**

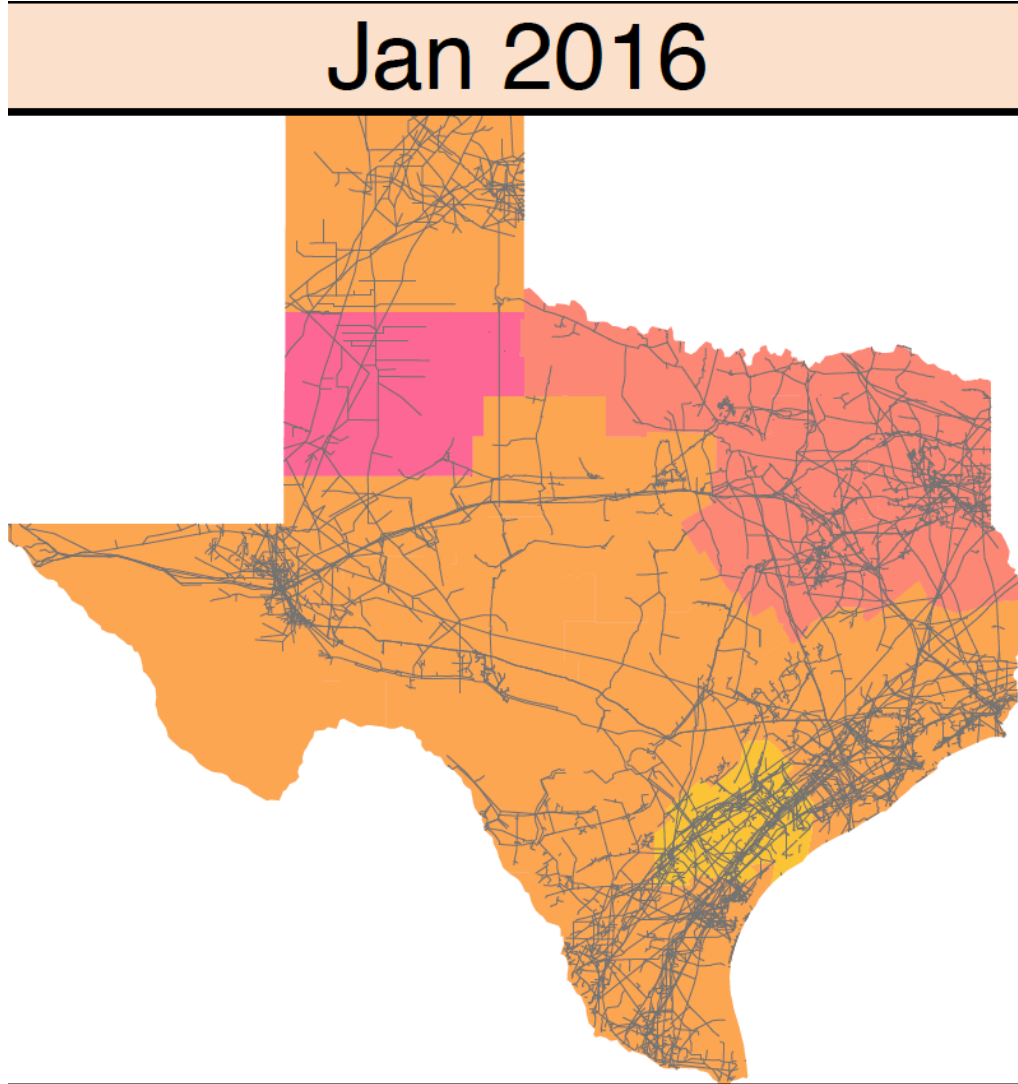
**Recently, well head price differentials have stabilized and most areas counties are experiencing wellhead prices similar to Henry Hub.**





**Natural Gas Price Premium to HH**

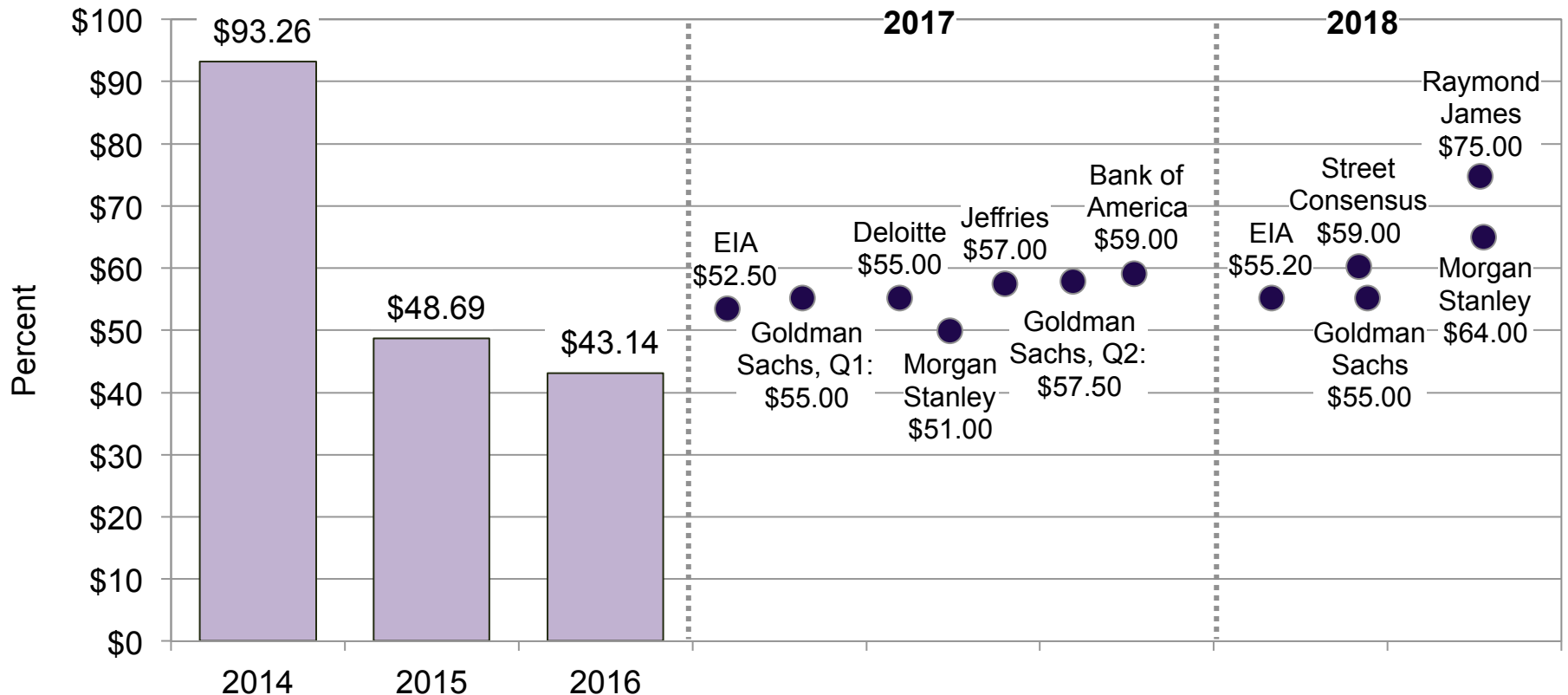
**Even today, price discounts appear to be impacted by the availability of natural gas pipelines needed to get gas to Gulf Coast. Current research focuses on importance of natural gas pipelines on upstream economics.**



# Outlook

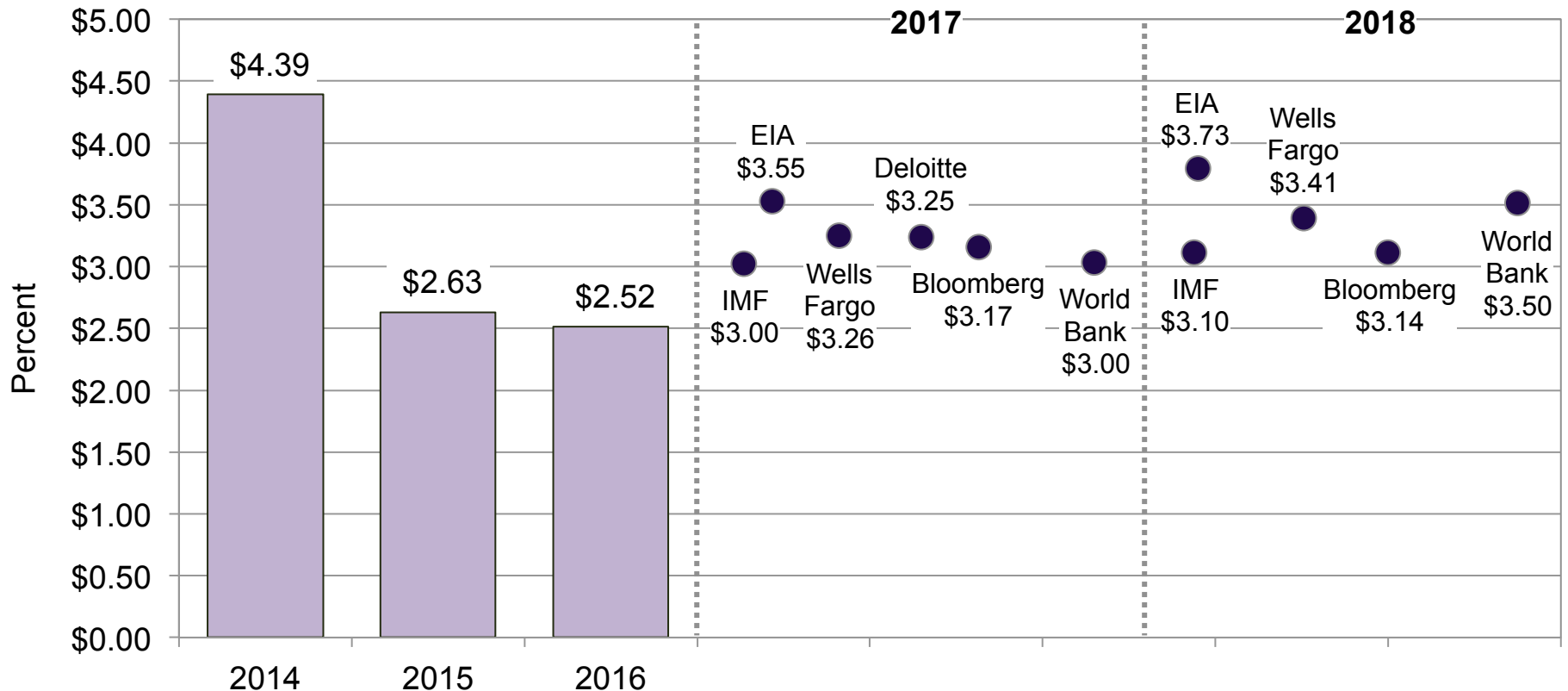
**Crude oil price outlook**

**Most crude oil price projections for 2017 are around \$55 per barrel. Prices are expected to increase in 2018, but remain below \$75 per barrel.**



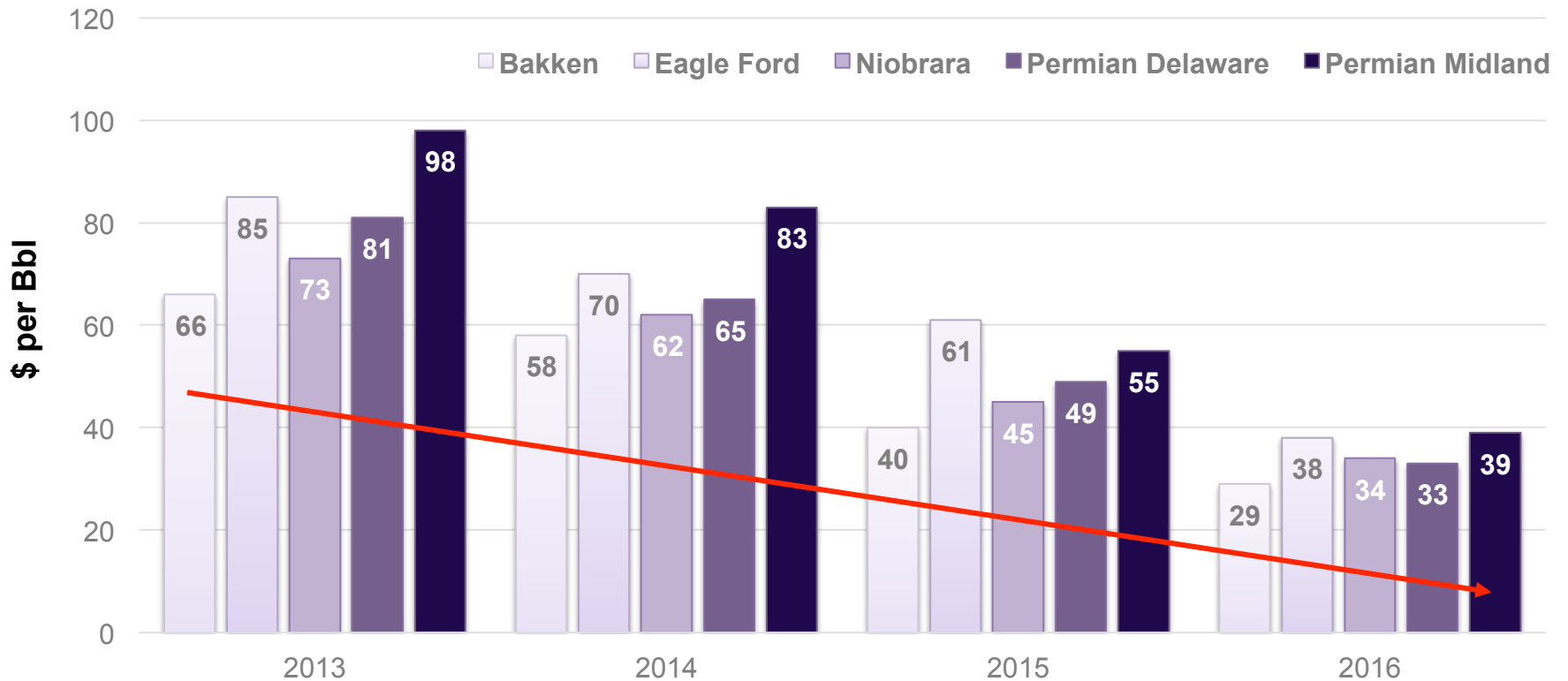
**Natural gas price outlook**

**Natural gas prices are expected to stay below \$3.55 per MMBtu in 2017 and under \$3.75 in 2018.**



**Wellhead breakeven prices for key shale plays**

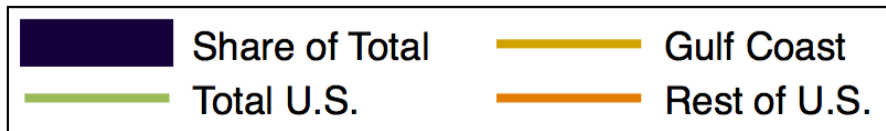
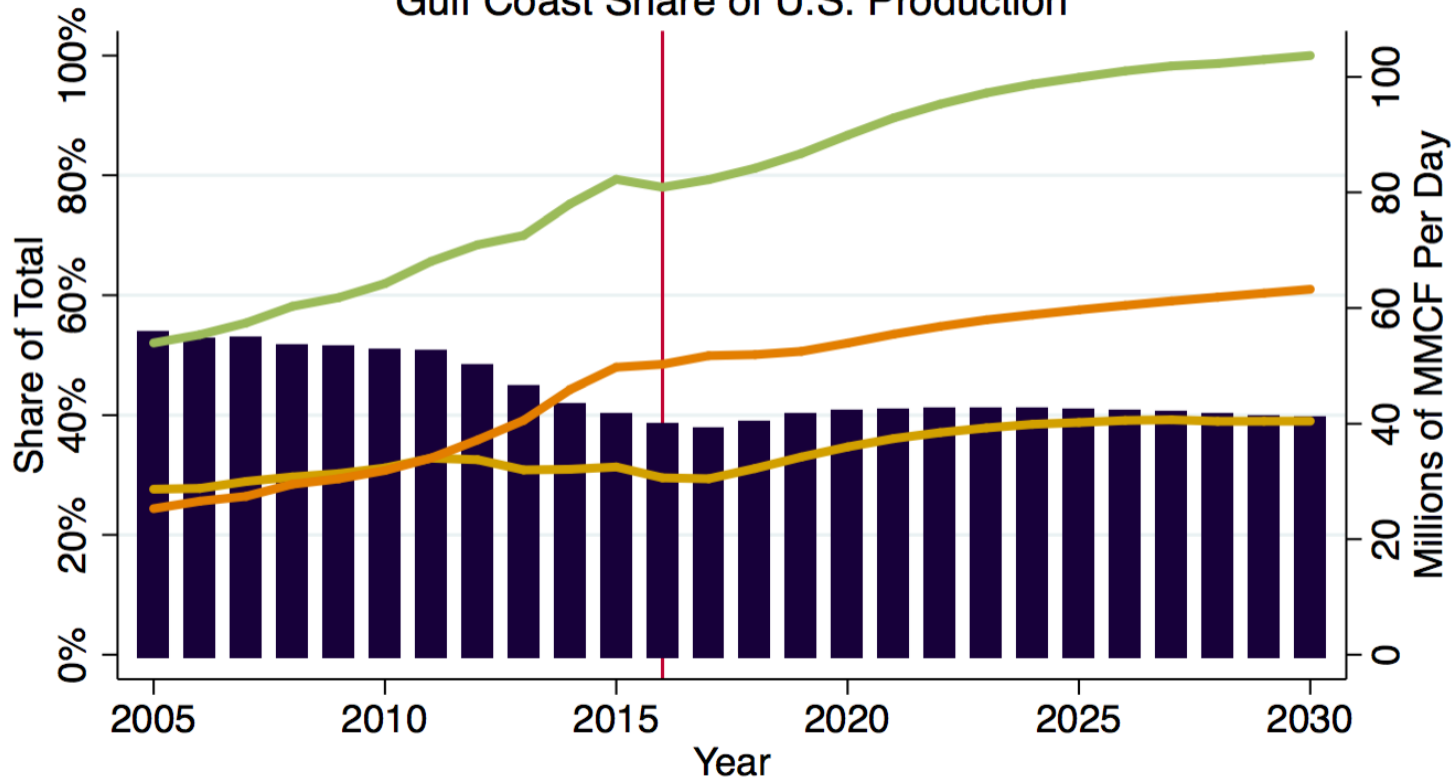
**Since 2013, the average wellhead break-even price for key shale plays has decreased from \$80 per barrel to \$35 per barrel, representing an average decrease of over 55 percent.**



Note: Author's estimate from source.  
Source: Rystad Energy NASWellCube.

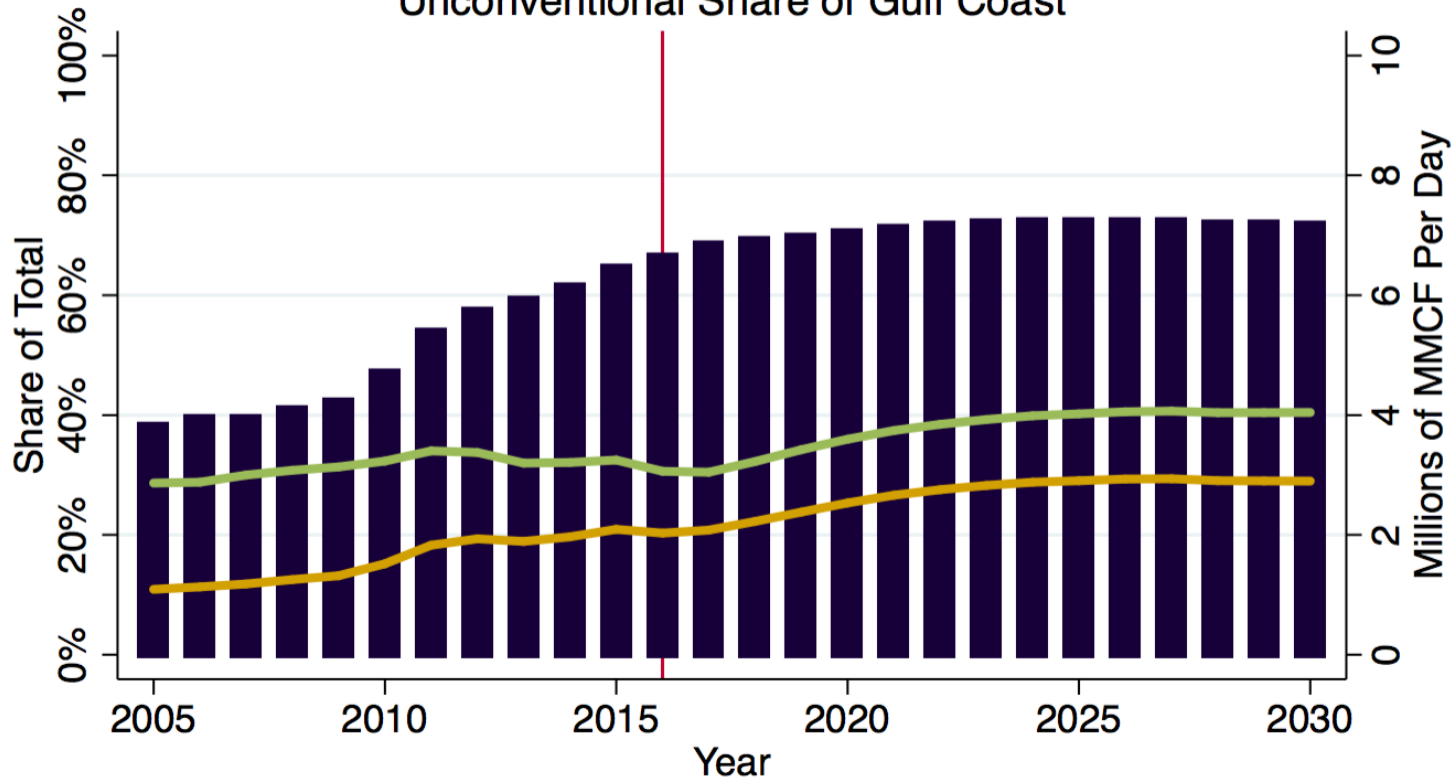
Gulf Coast Natural Gas Production Forecast

Natural Gas Production Forecast  
Gulf Coast Share of U.S. Production



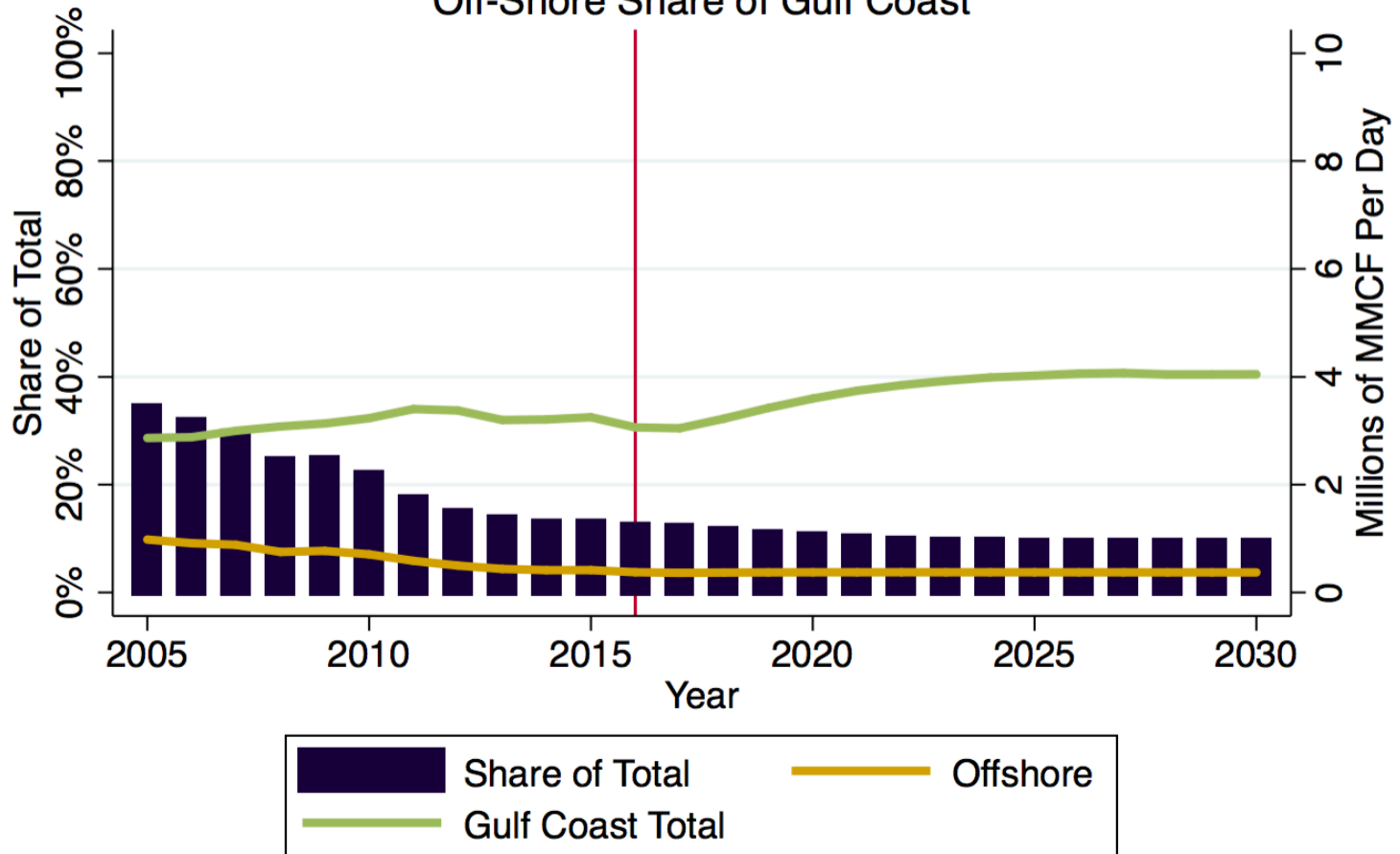
Unconventional On-Shore Natural Gas Oil Forecast

Gulf Coast Natural Gas Production  
Unconventional Share of Gulf Coast



Off-Shore Natural Gas Forecast

Gulf Coast Natural Gas Production  
Off-Shore Share of Gulf Coast

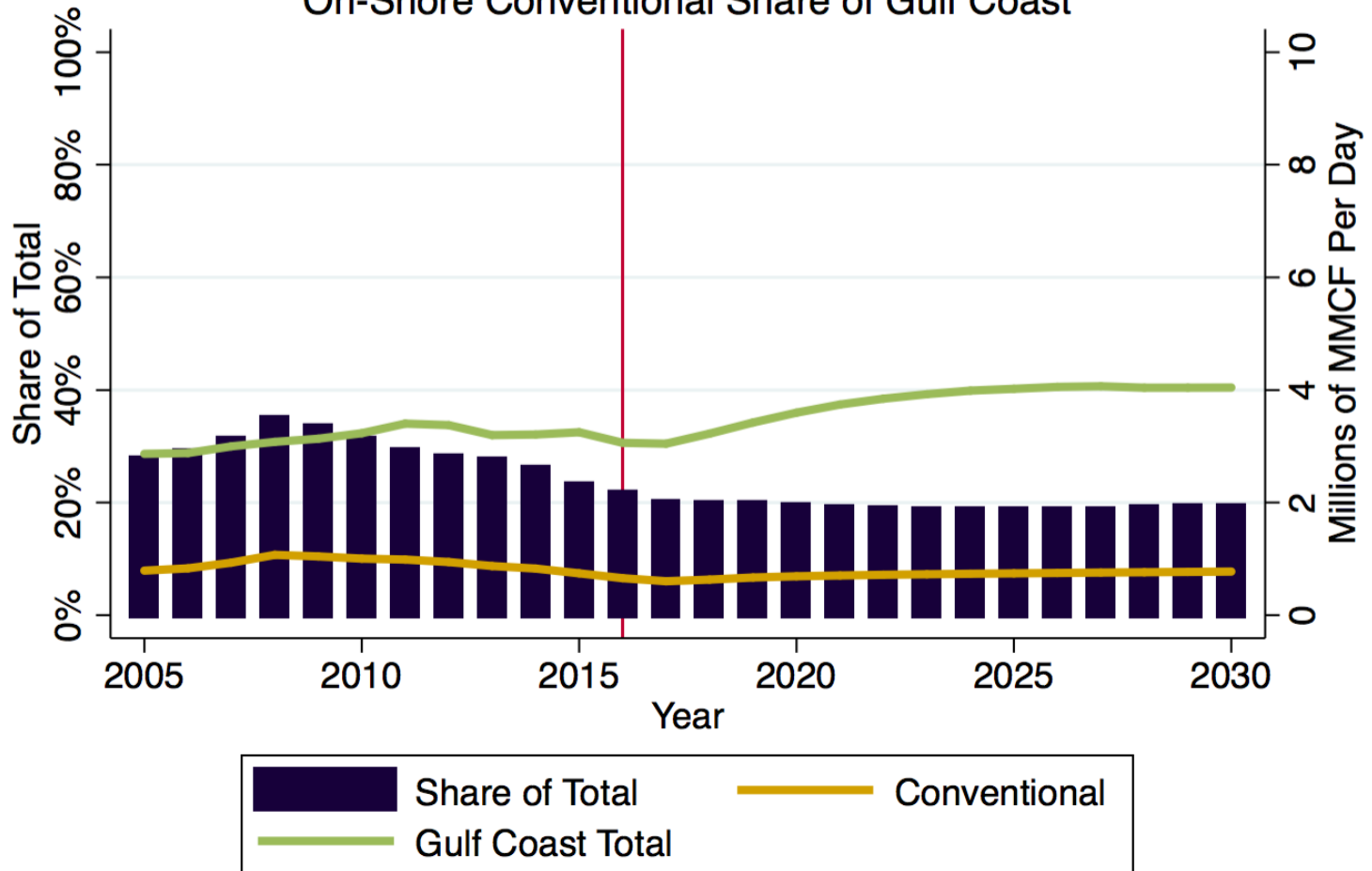


Note: Offshore includes both state and federal waters.



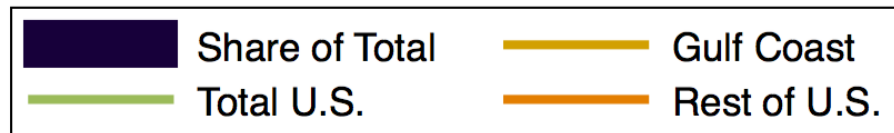
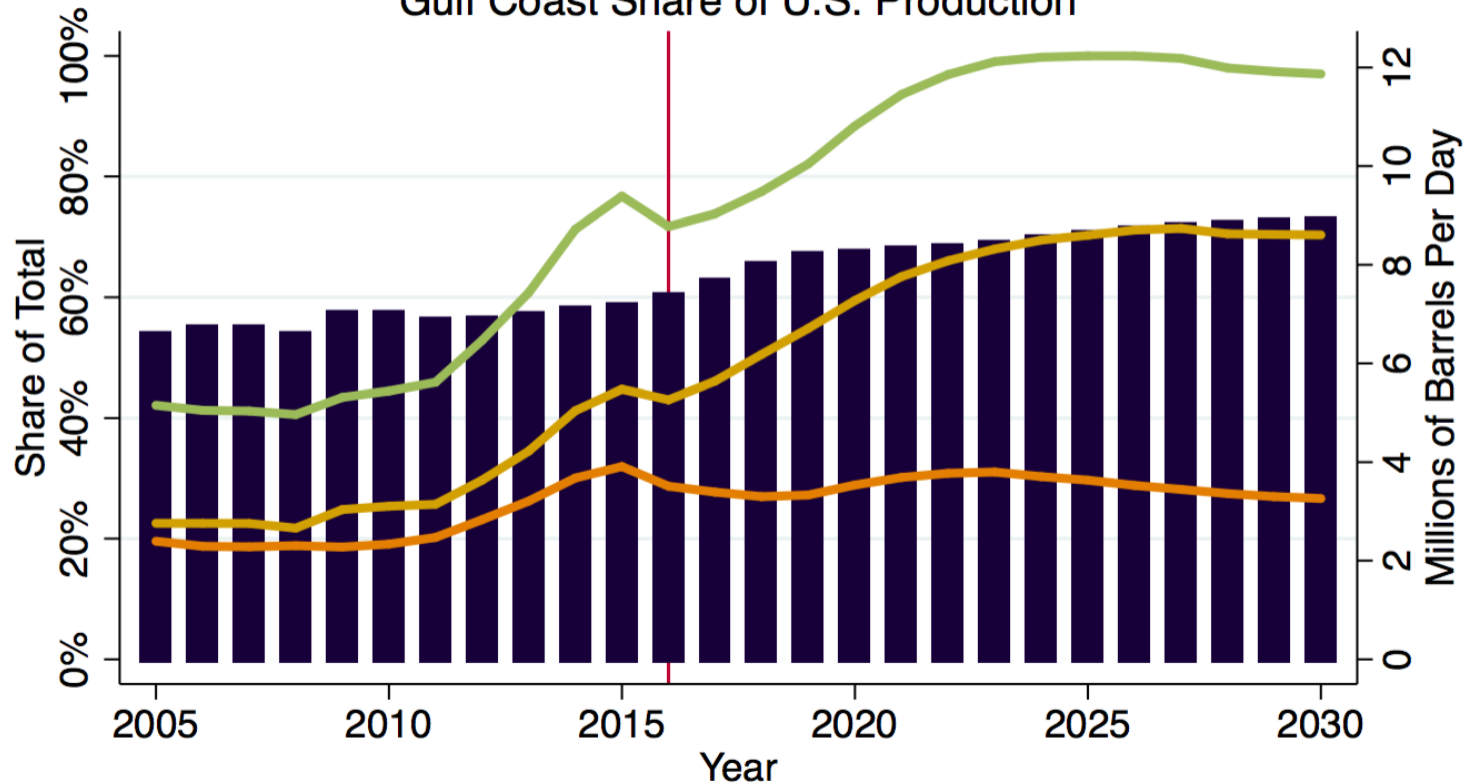
Conventional On-Shore Natural Gas Forecast

Gulf Coast Natural Gas Production  
On-Shore Conventional Share of Gulf Coast



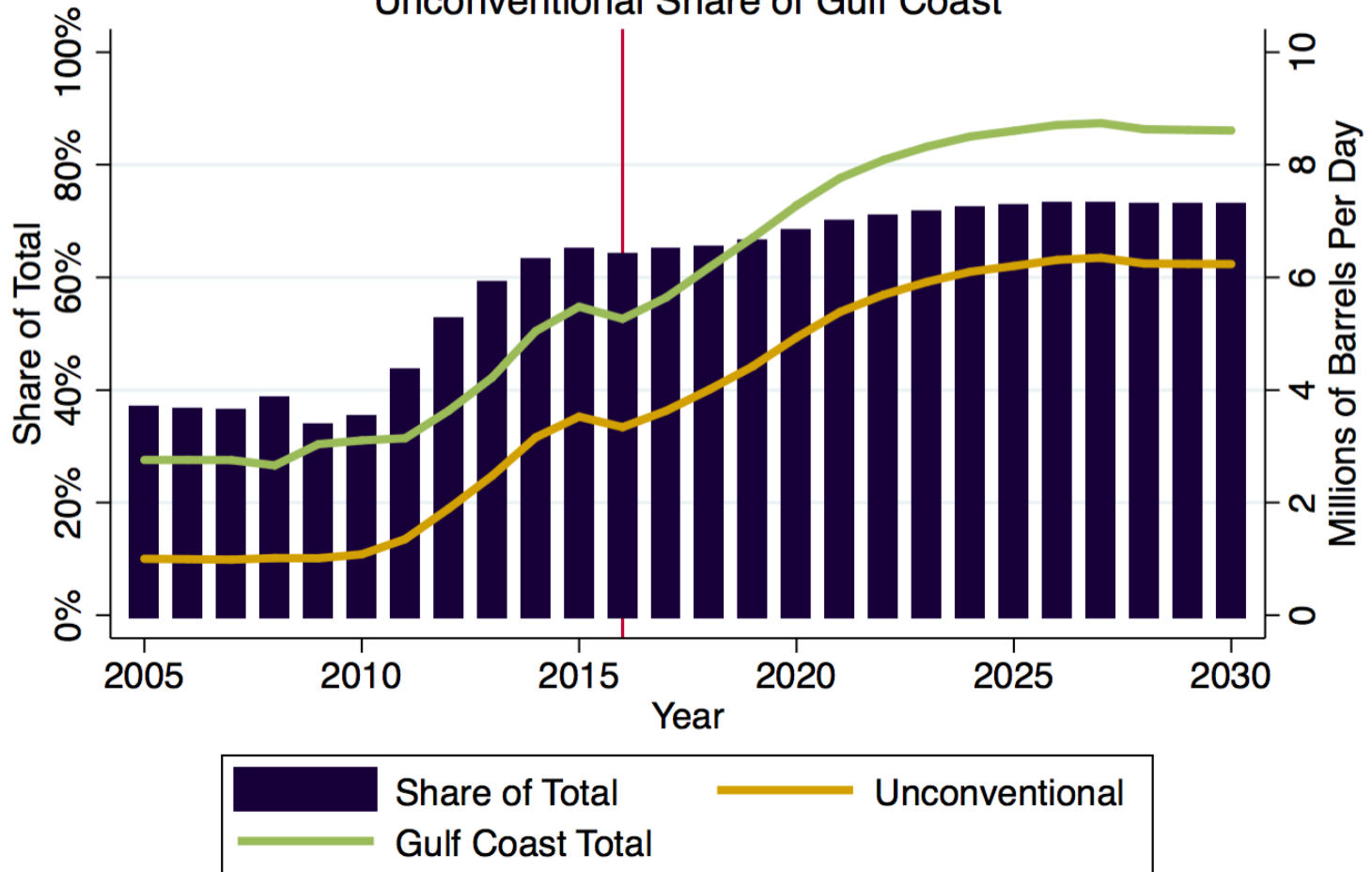
Gulf Coast Crude Oil Production Forecast

Crude Oil Production Forecast  
Gulf Coast Share of U.S. Production



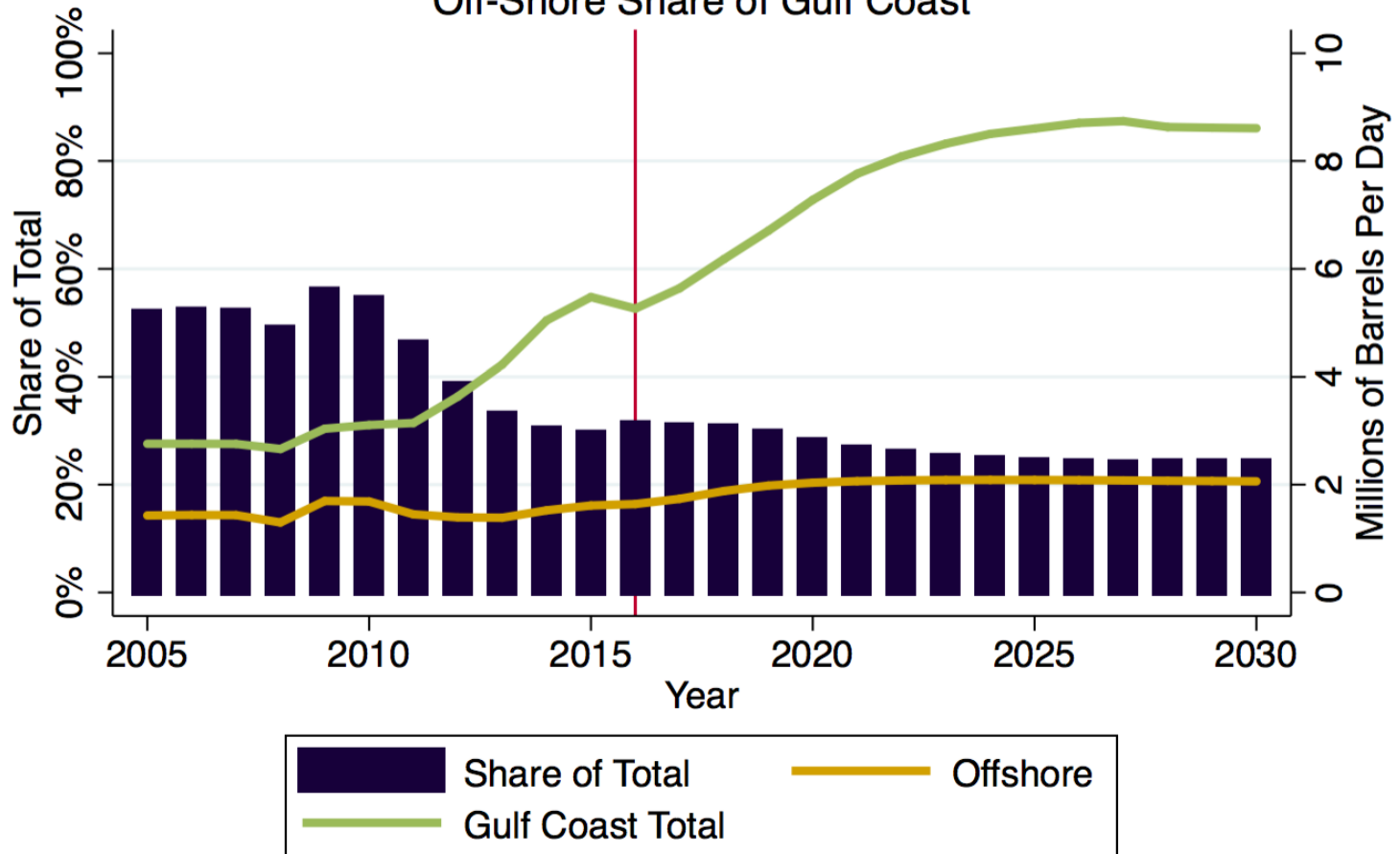
Unconventional On-Shore Crude Oil Forecast

Gulf Coast Crude Oil Production  
Unconventional Share of Gulf Coast



Off-Shore Crude Oil Forecast

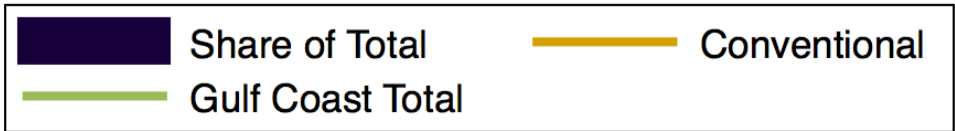
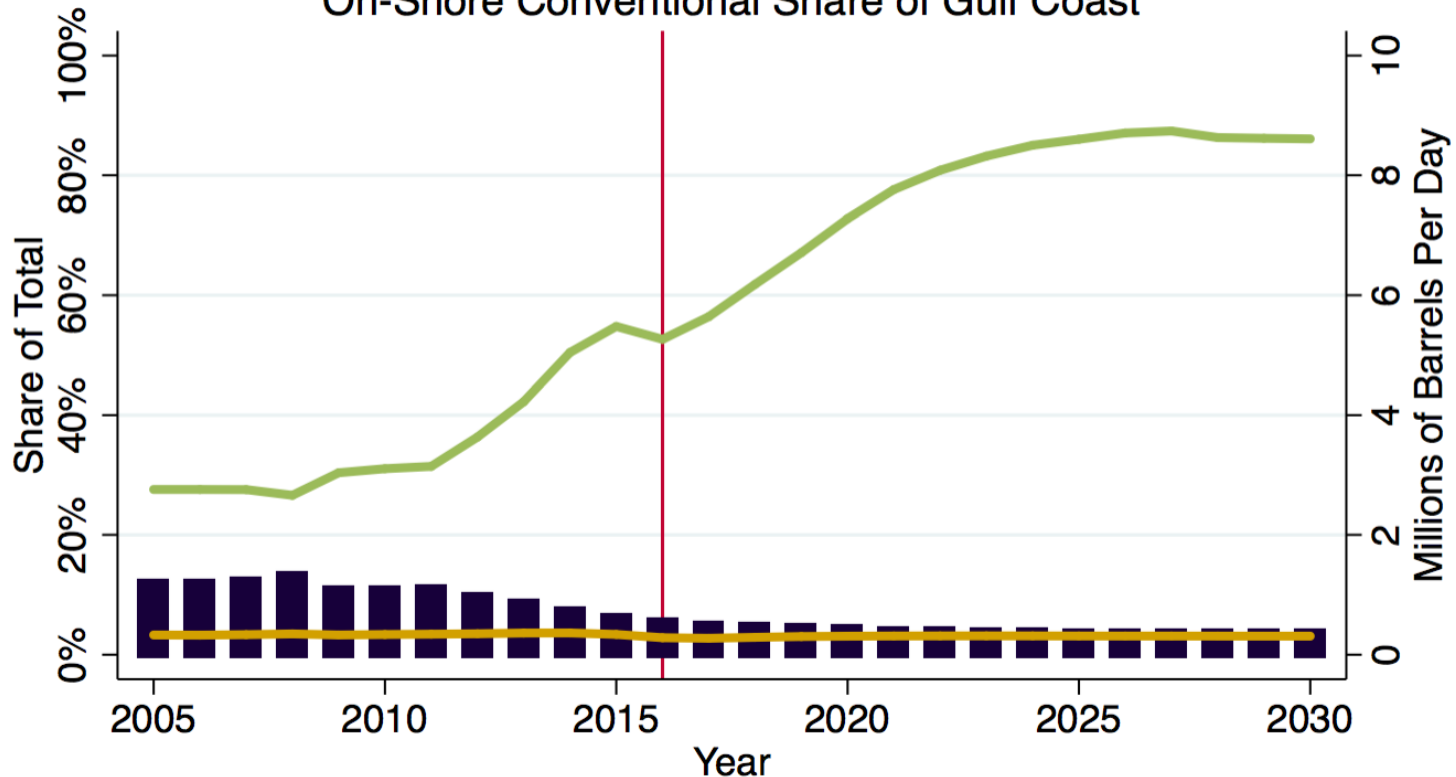
Gulf Coast Crude Oil Production  
Off-Shore Share of Gulf Coast



Note: Offshore includes both state and federal waters.

Conventional On-Shore Crude Oil Forecast

Gulf Coast Crude Oil Production  
On-Shore Conventional Share of Gulf Coast



## Conclusions

## Conclusions

- Over the past decade, worldwide energy markets have been fundamentally changed due to the advent of U.S. shale oil and gas development.
- These changes have not only impacted *where* hydrocarbons are produced, but has also created significant change to the transportation, processing, and final use.
- The gulf coast has seen large increases in oil and gas production, with these increases mainly concentrated in Texas. Louisiana and Federal Offshore production have decreased in their relative importance.
- Significant investments in the refining, petrochemicals, and transport of hydrocarbons have been made, and will continue to be made over the next decade. The Gulf Coast is well positioned, and could potentially become the world-cited crude benchmark.



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