



Unconventional Oil and Gas Activity and Crude Export Restrictions

A discussion of U.S. policy of restricting crude oil exports.

Tulane Engineering Forum

April 17, 2015

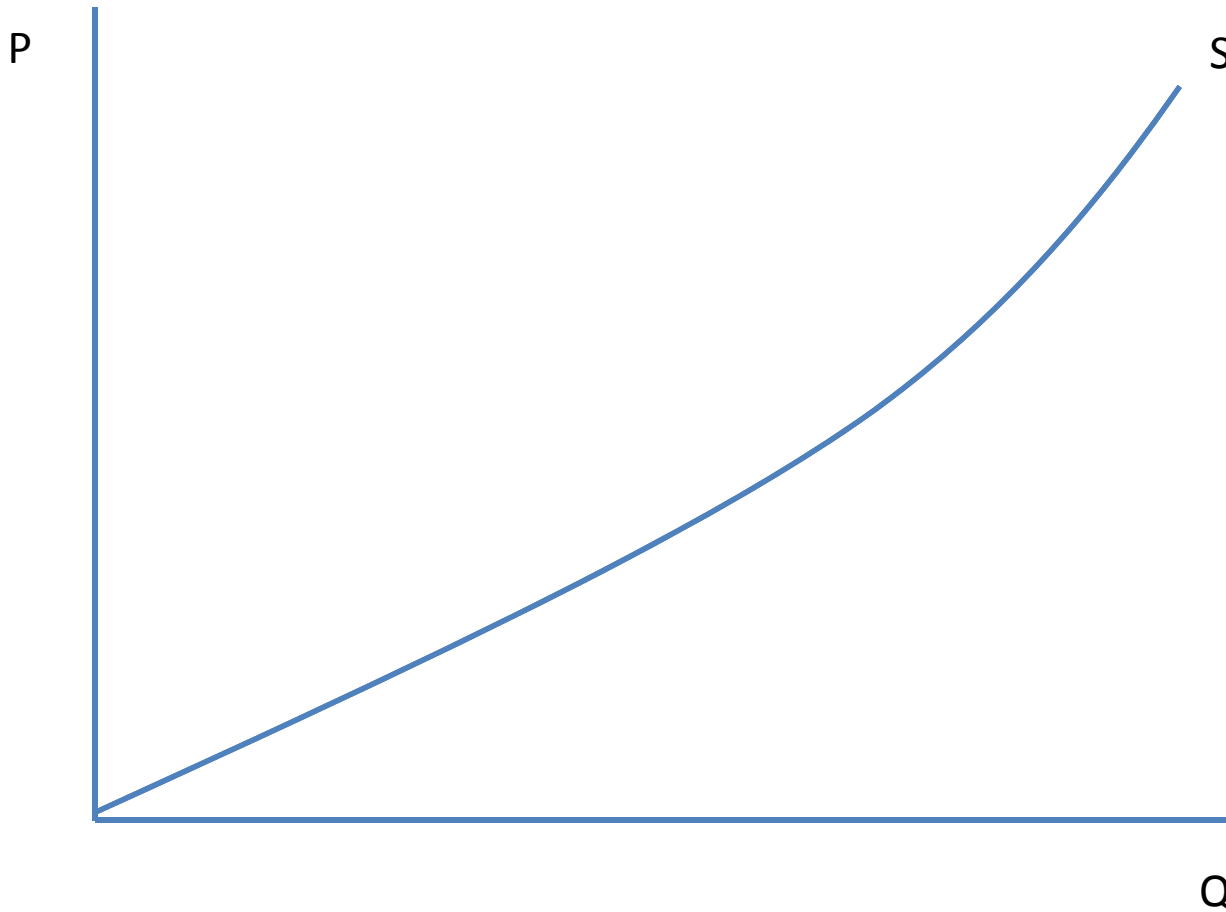
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**History of U.S. Export Laws and
Restrictions**

History of Export Restrictions

- **1973 Oil Crisis – OPEC proclaimed an embargo on oil that lasted from October of 1973 to March of 1974.**
- **December 1975 – President Ford signed the Energy Policy and Conservation Act (EPCA)**
 - **Section 103 prohibited the export of crude oil and natural gas.**
 - **EPCA created a Strategic Petroleum Reserve.**

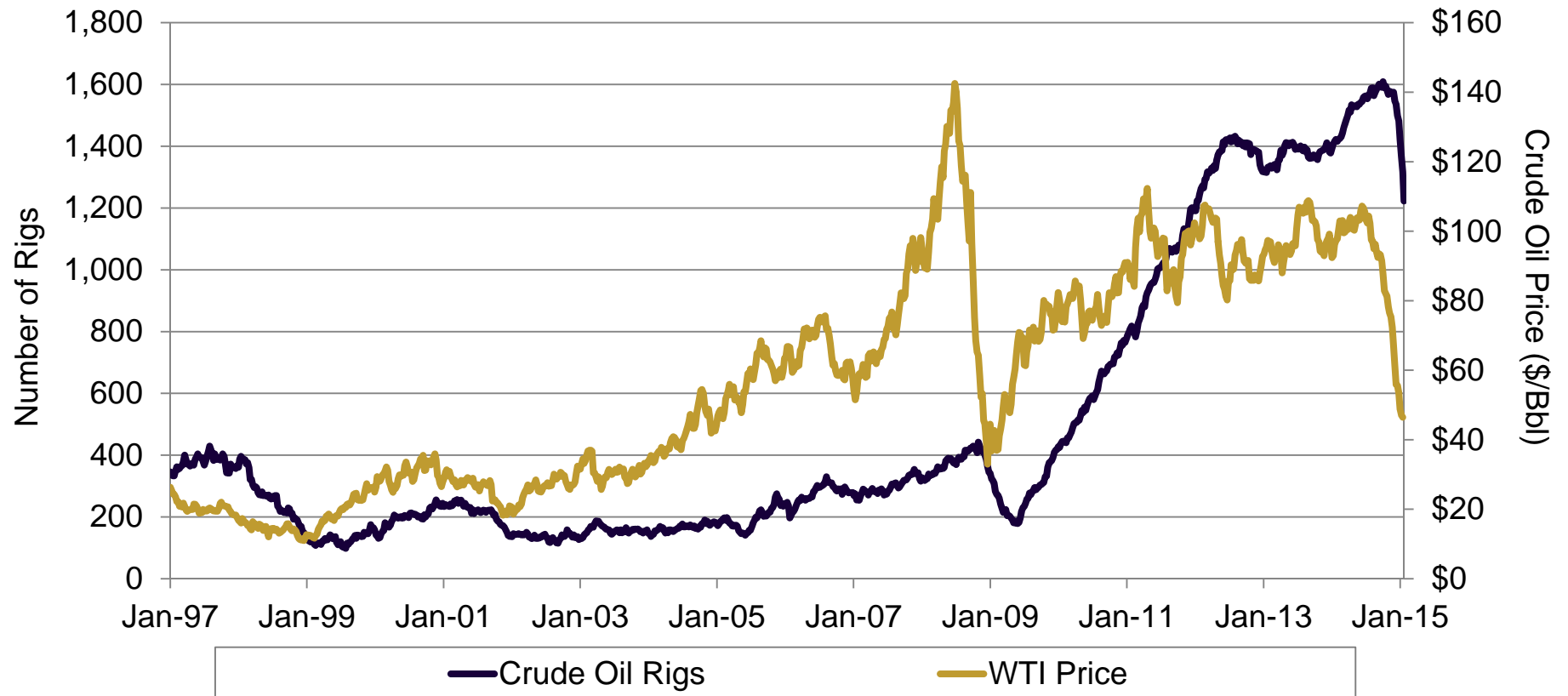
Economics of Export Restrictions



Domestic supply of crude oil and unrefined natural gas is positively related to price.

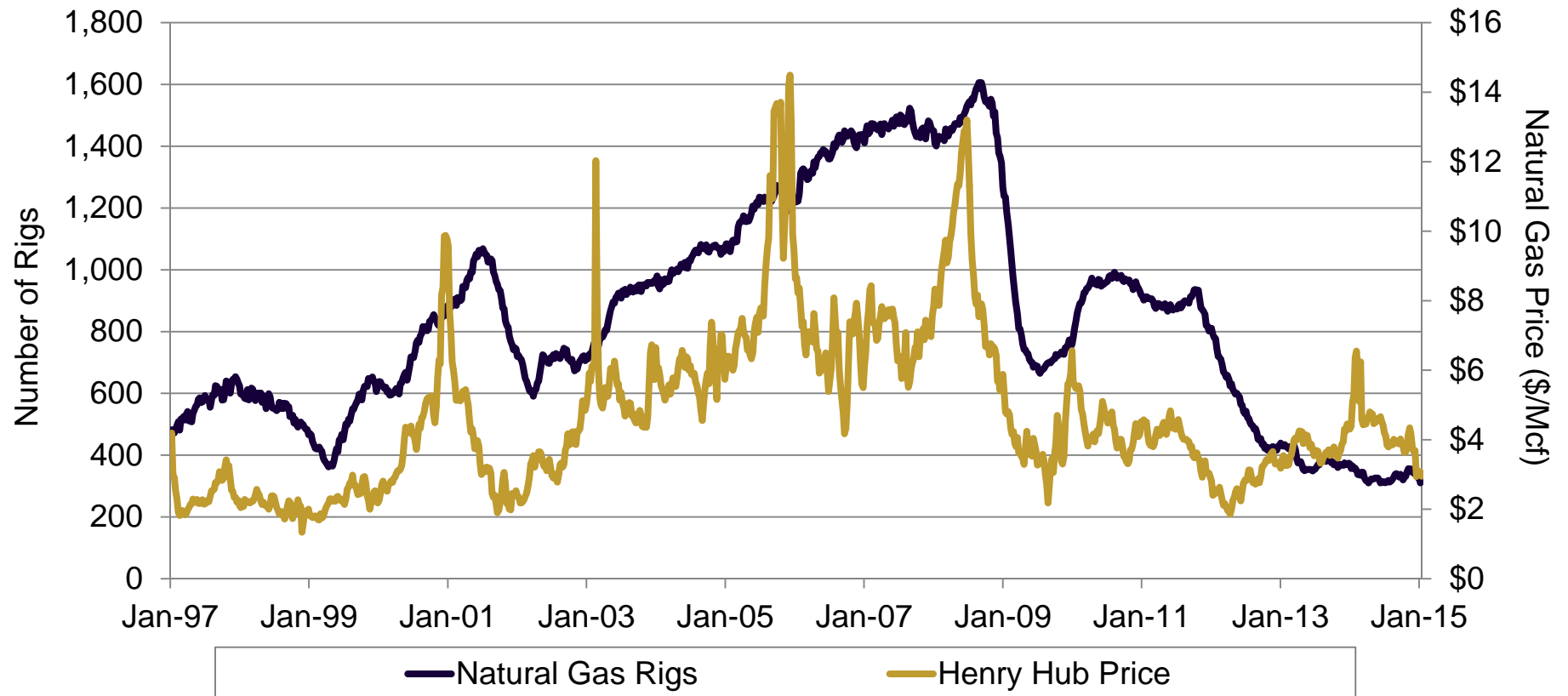
U.S. Crude Oil Rig Count and Spot Price

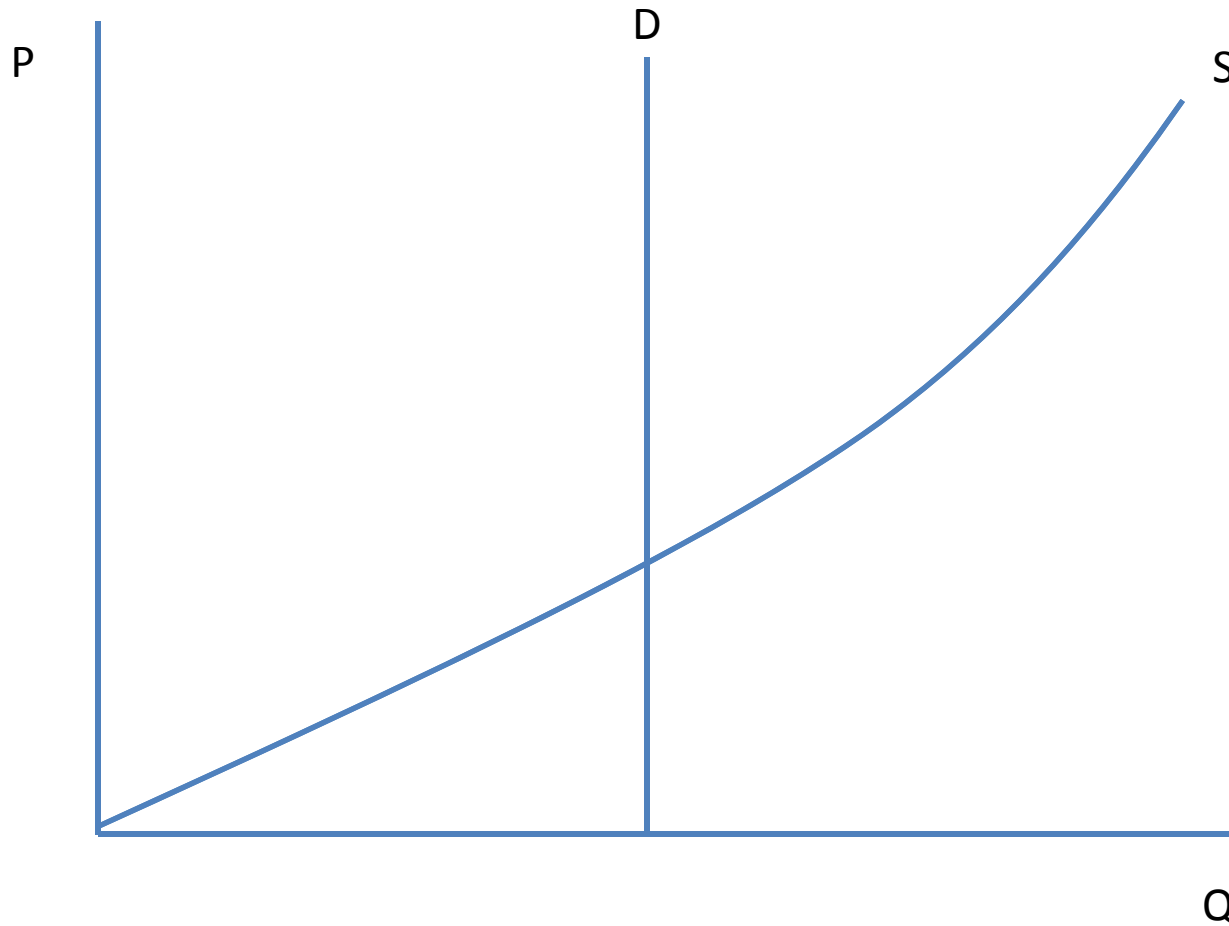
Crude oil rigs move in tandem with WTI spot prices.



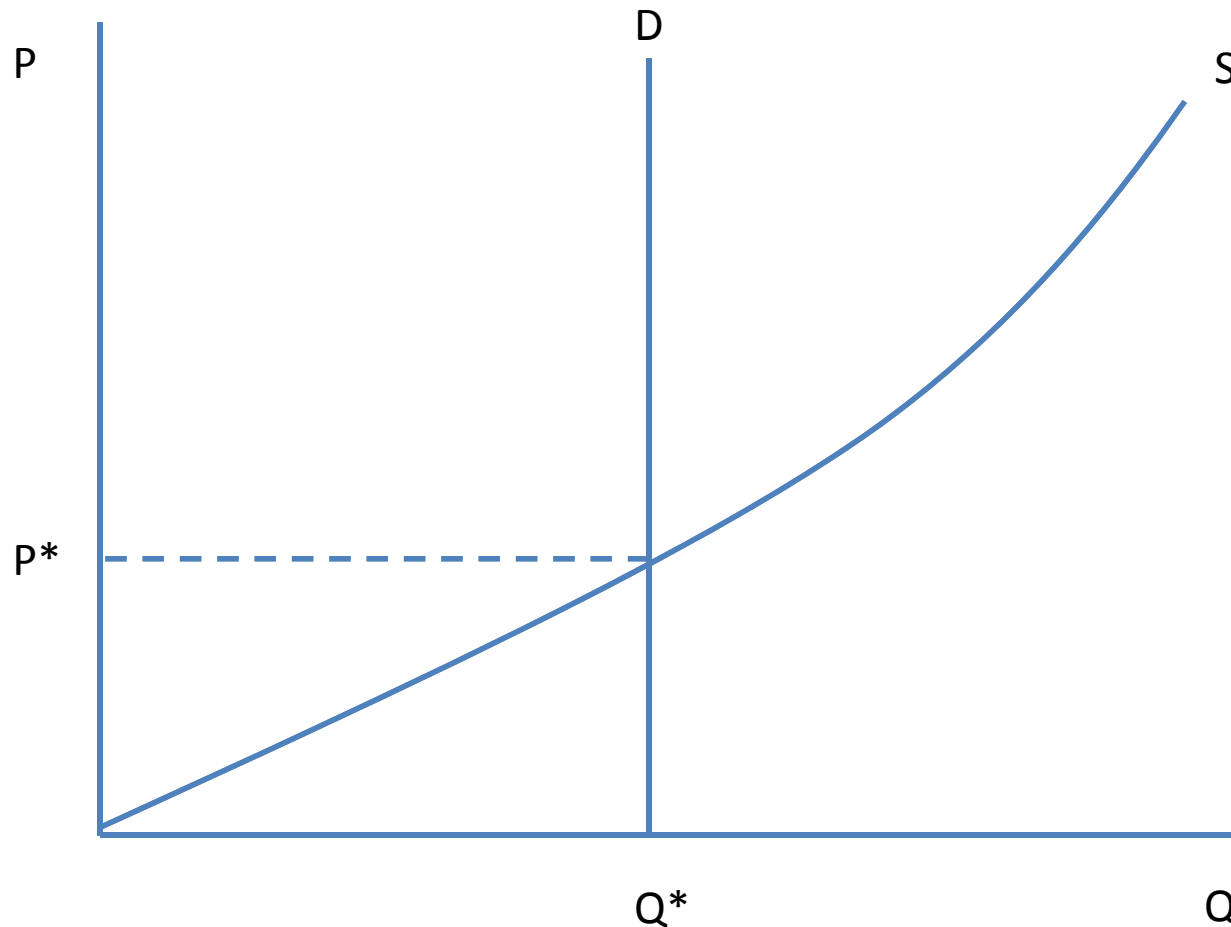
U.S. Natural Gas Rig Count and Henry Hub Price

Natural gas rigs also also follow the natural gas spot price.

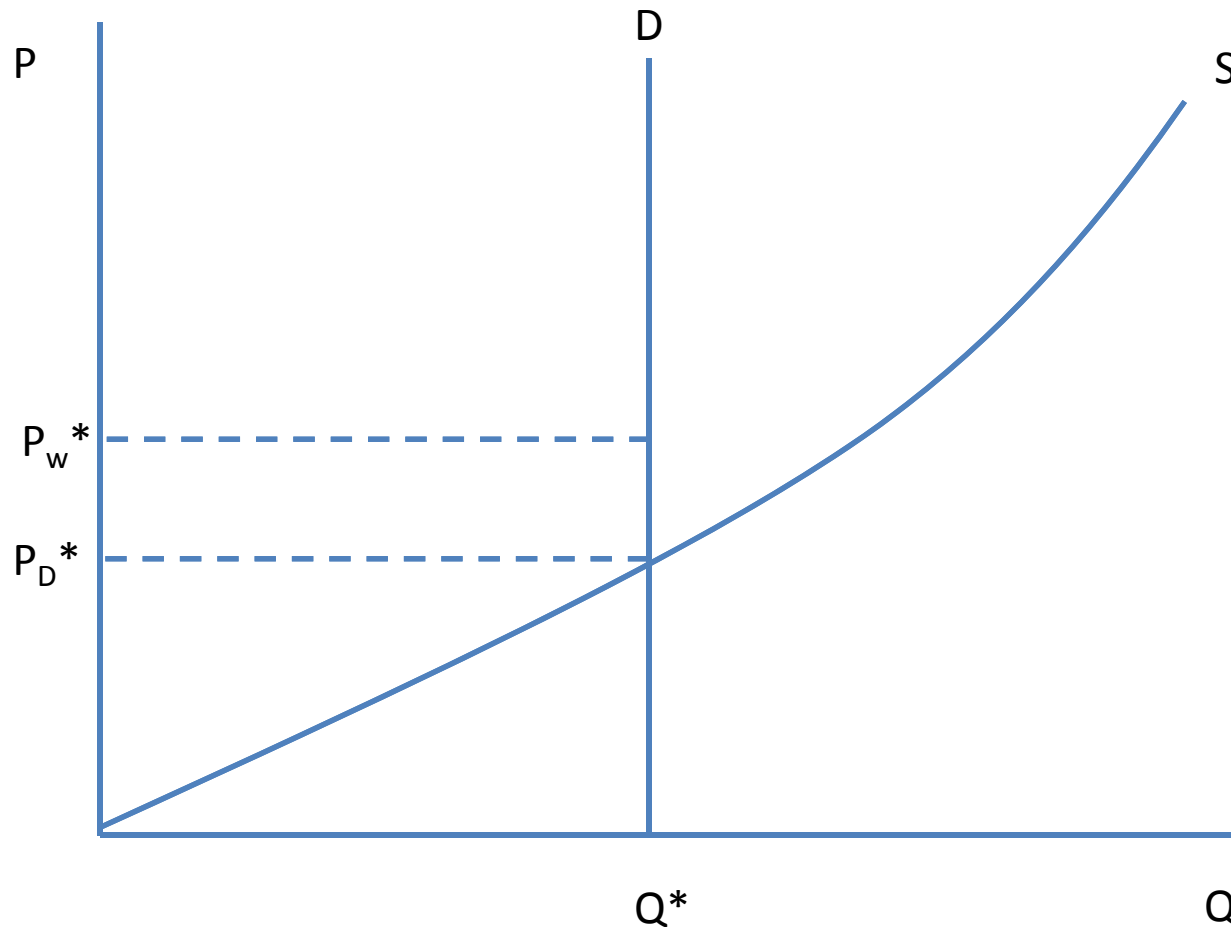




Crude oil and unrefined natural gas need to be refined.
Refining capacity is fixed in the short run.



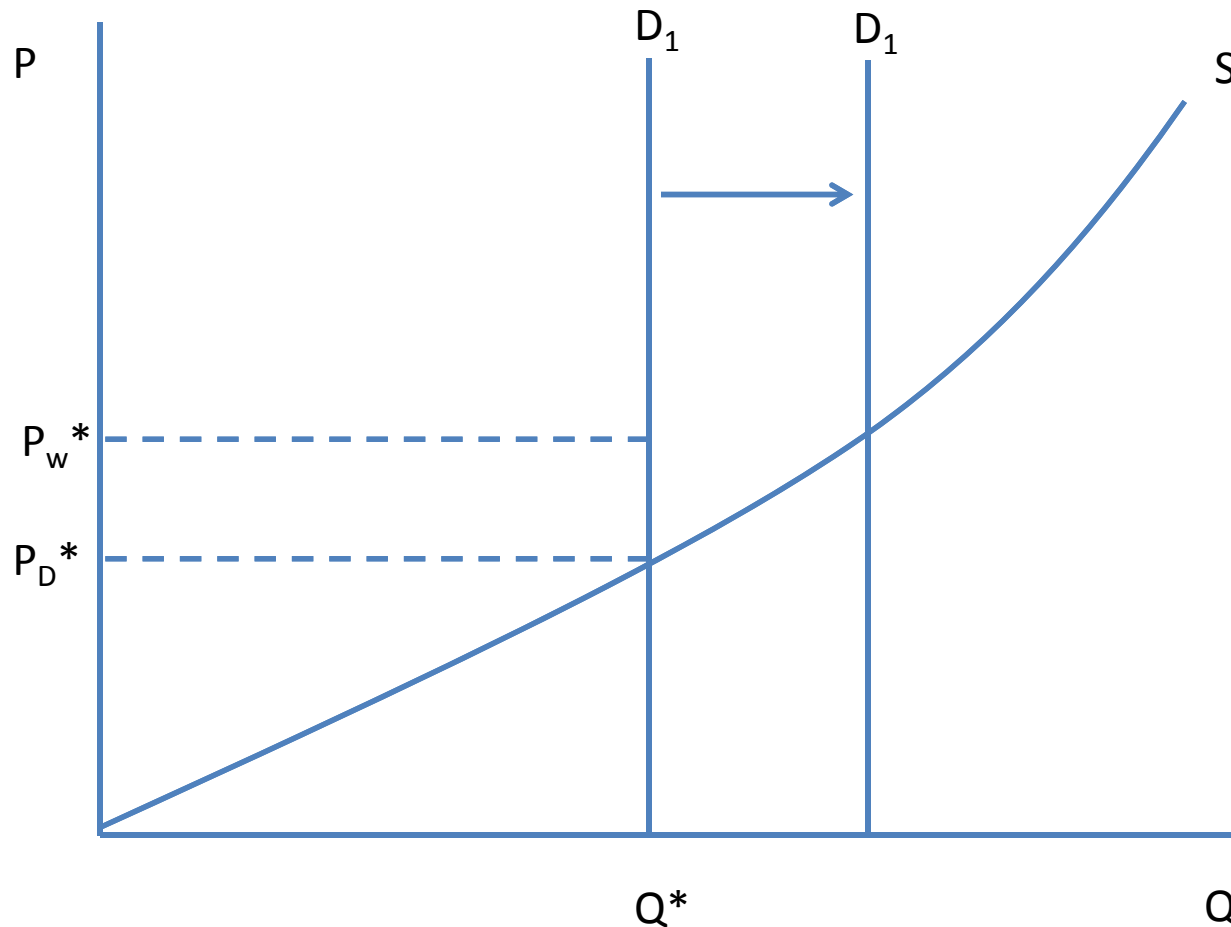
Supply and demand meet to achieve an “equilibrium price” and “equilibrium quantity.”
Note: this is the *domestic* market for crude.



What if the world price is higher than the domestic prices?

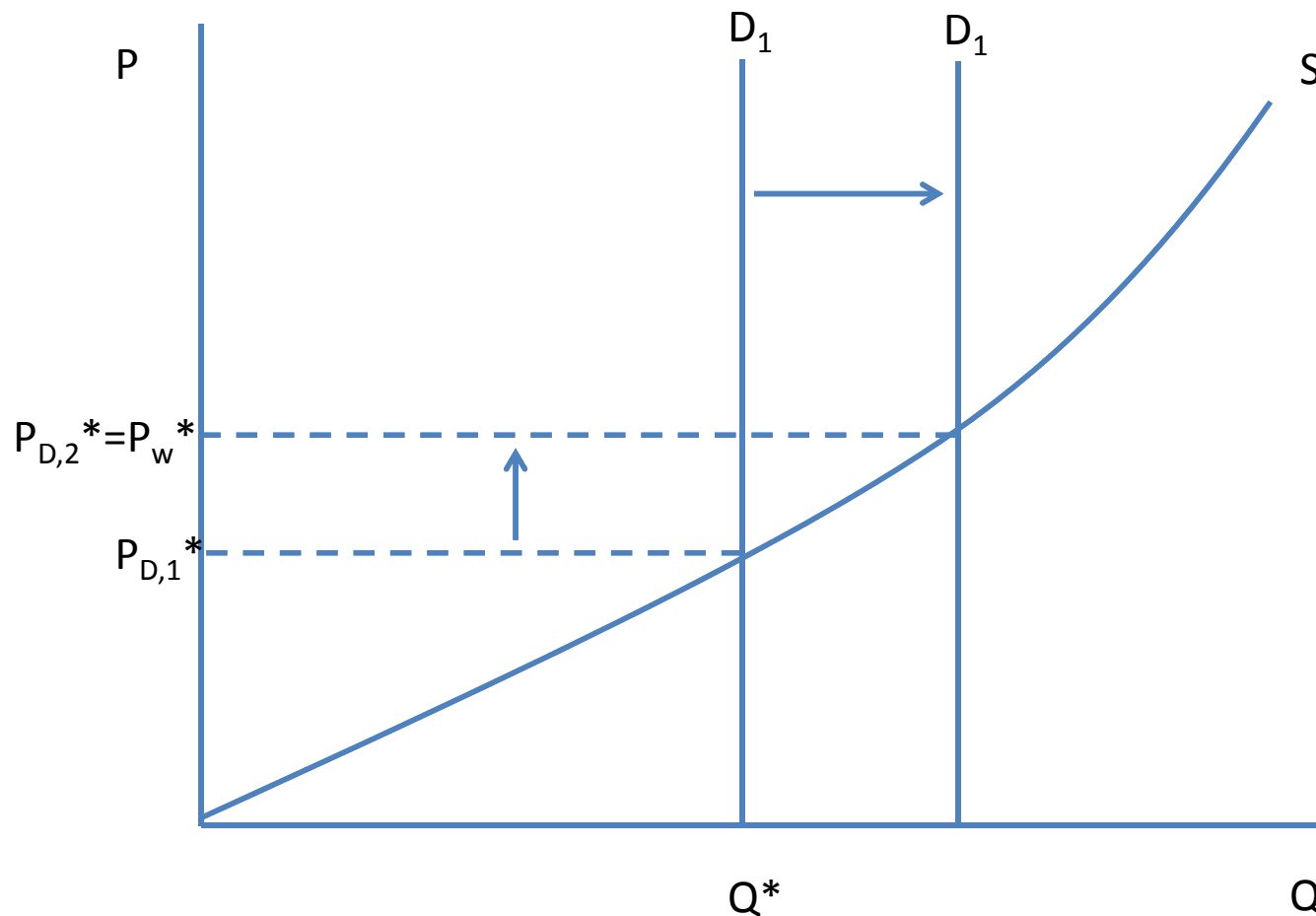
Due to export restrictions, U.S. producers are not allowed to sell at higher world price!

Who are the winners and losers?



What about the long run?

Refiners will increase capacity which will drive up the domestic price of crude.



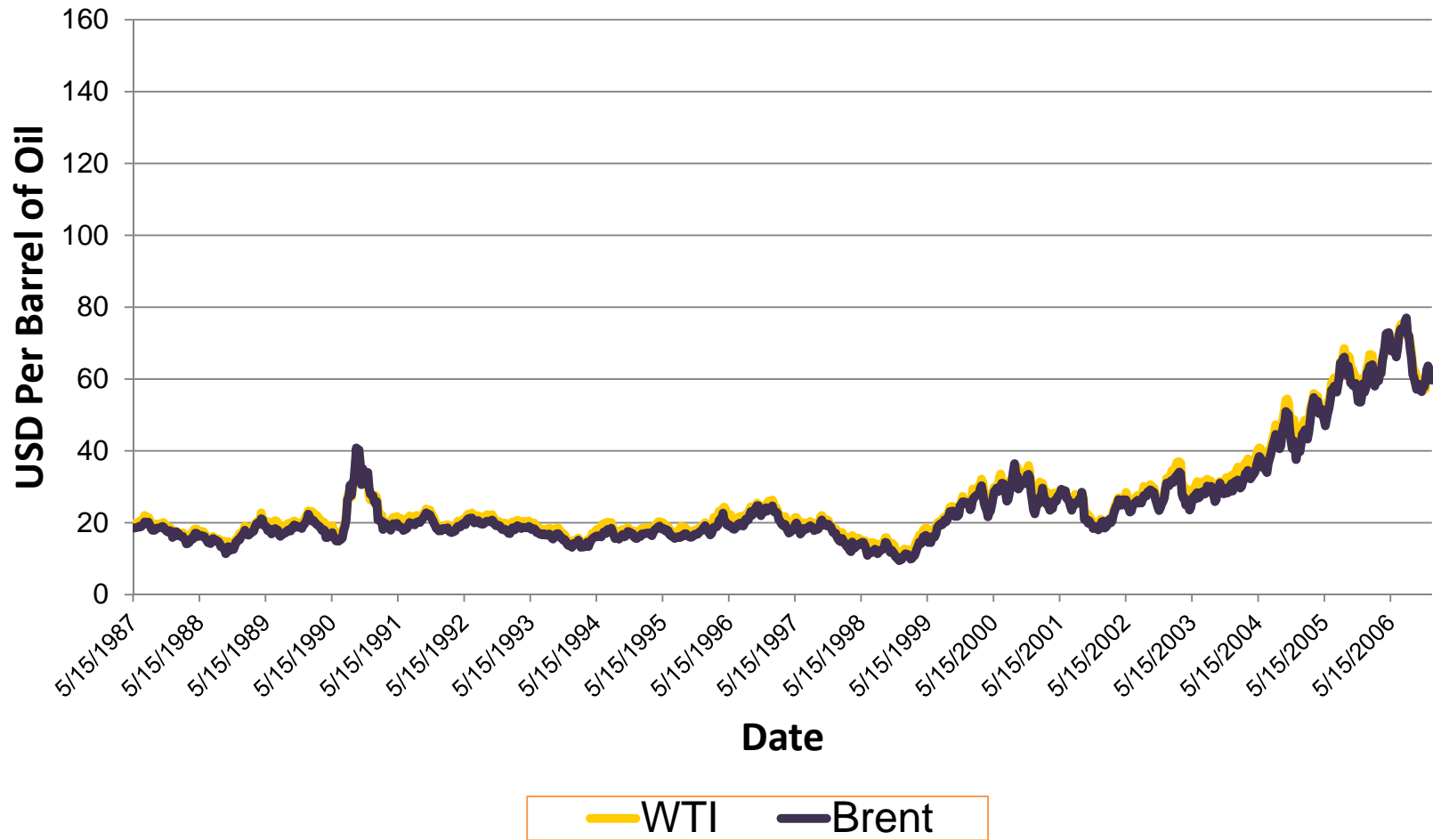
This will occur until the world price is equal to the domestic price.

The Short Run vs. Long Run

- **In the short run, refiners can benefit from crude export restrictions.**
- **In the long run, economic theory predicts that U.S. crude prices and global prices will move in tandem.**
- **Does the data support the theory??**

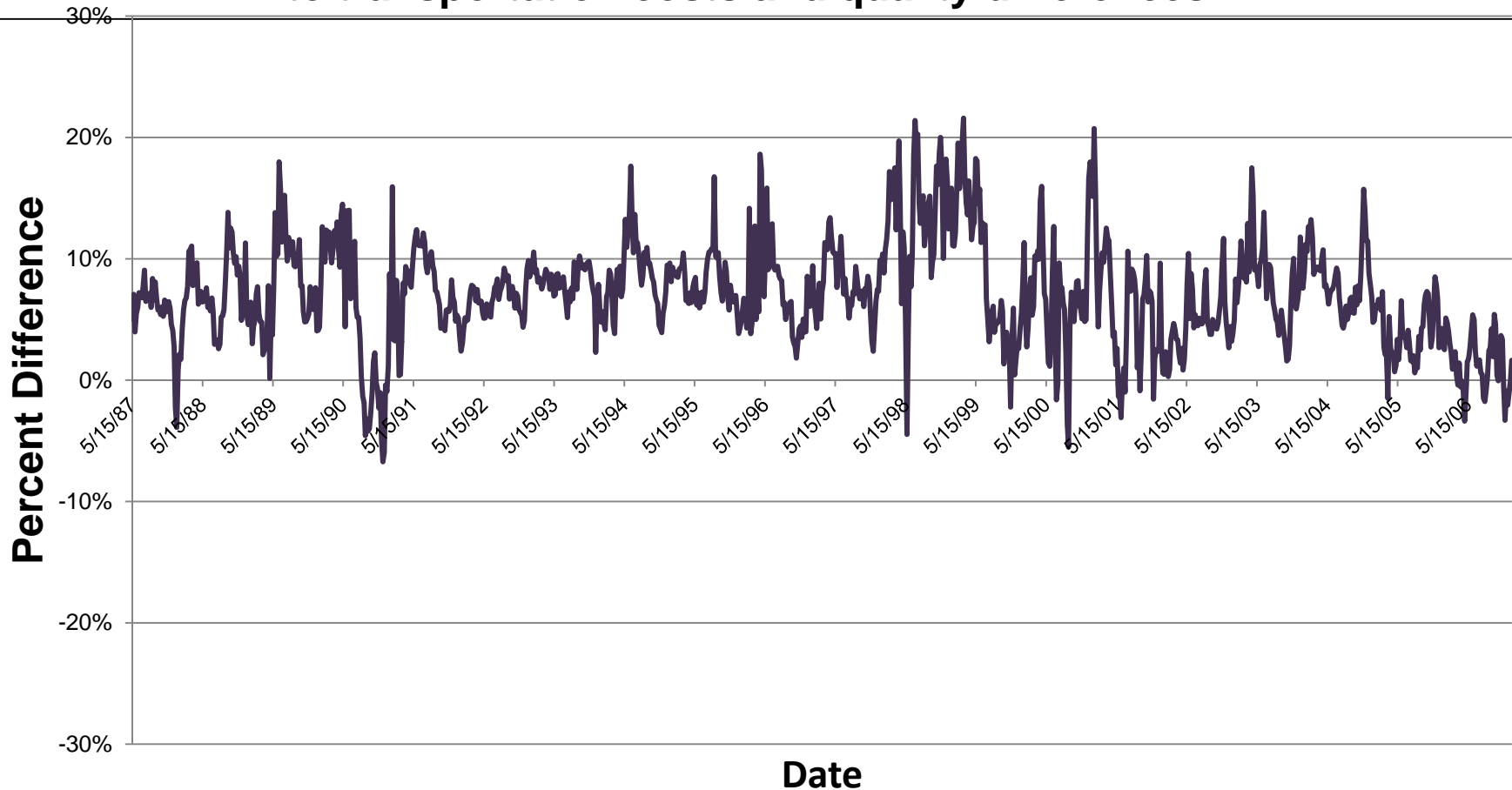
WTI and Brent Crude Spot Prices

Brent and WTI Spot Prices Move in Tandem



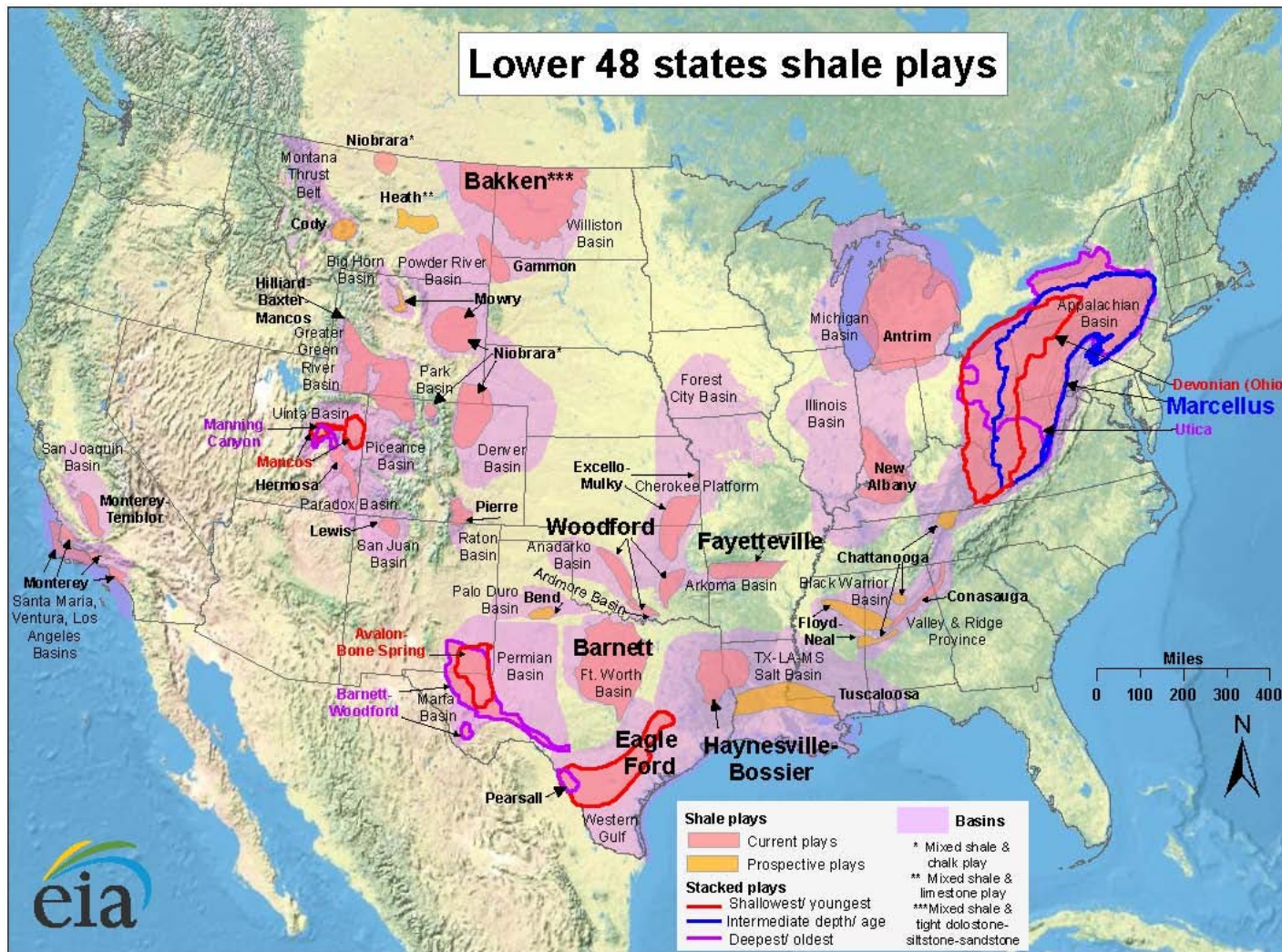
Price Differential Between WTI and Brent

WTI has Consistently been priced at approximately 5-15 percent premium due to transportation costs and quality differences .



**Unconventional Oil and Gas Plays and
the Global Market**

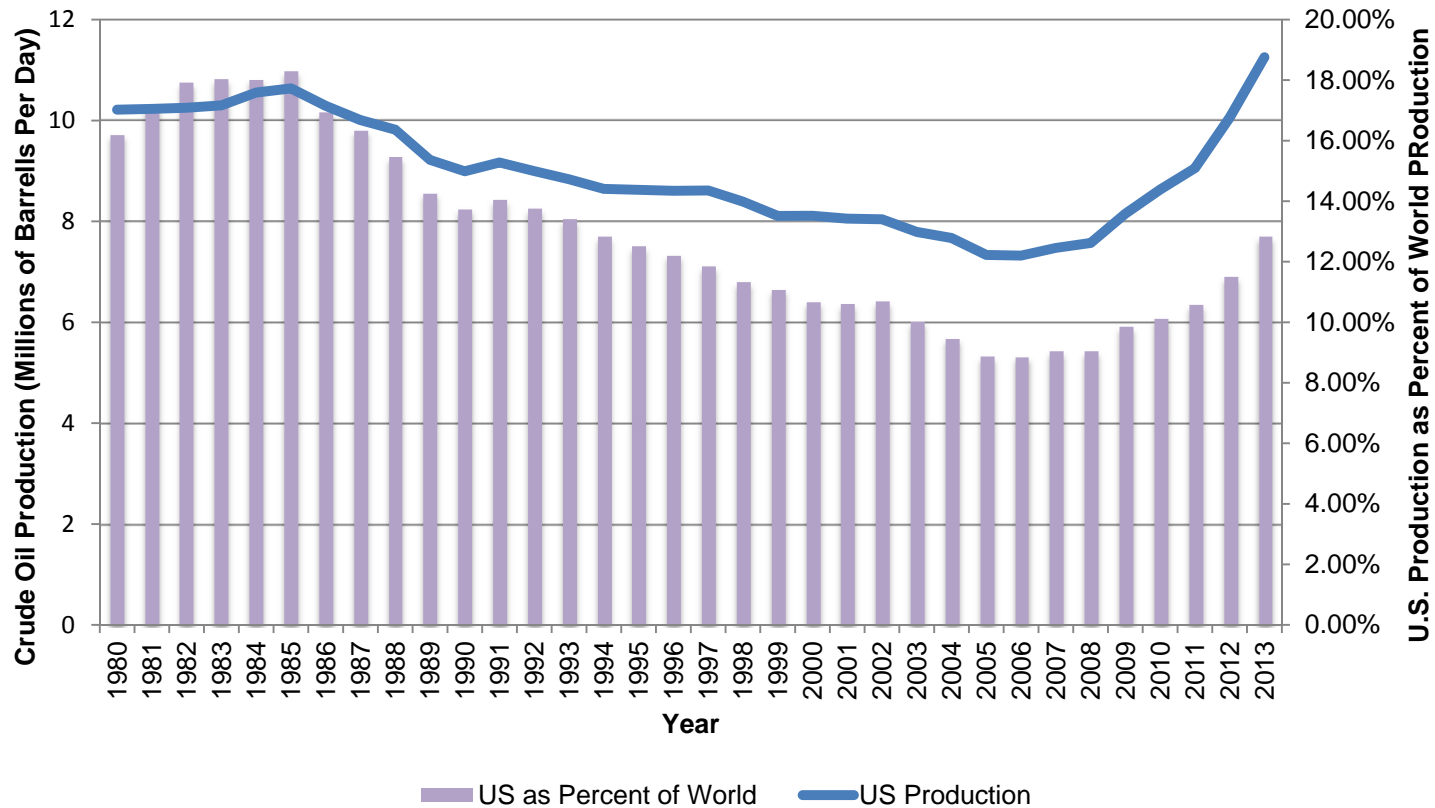
Domestic Shale Basins and Plays



U.S. Crude Oil Rig Count and Spot Price

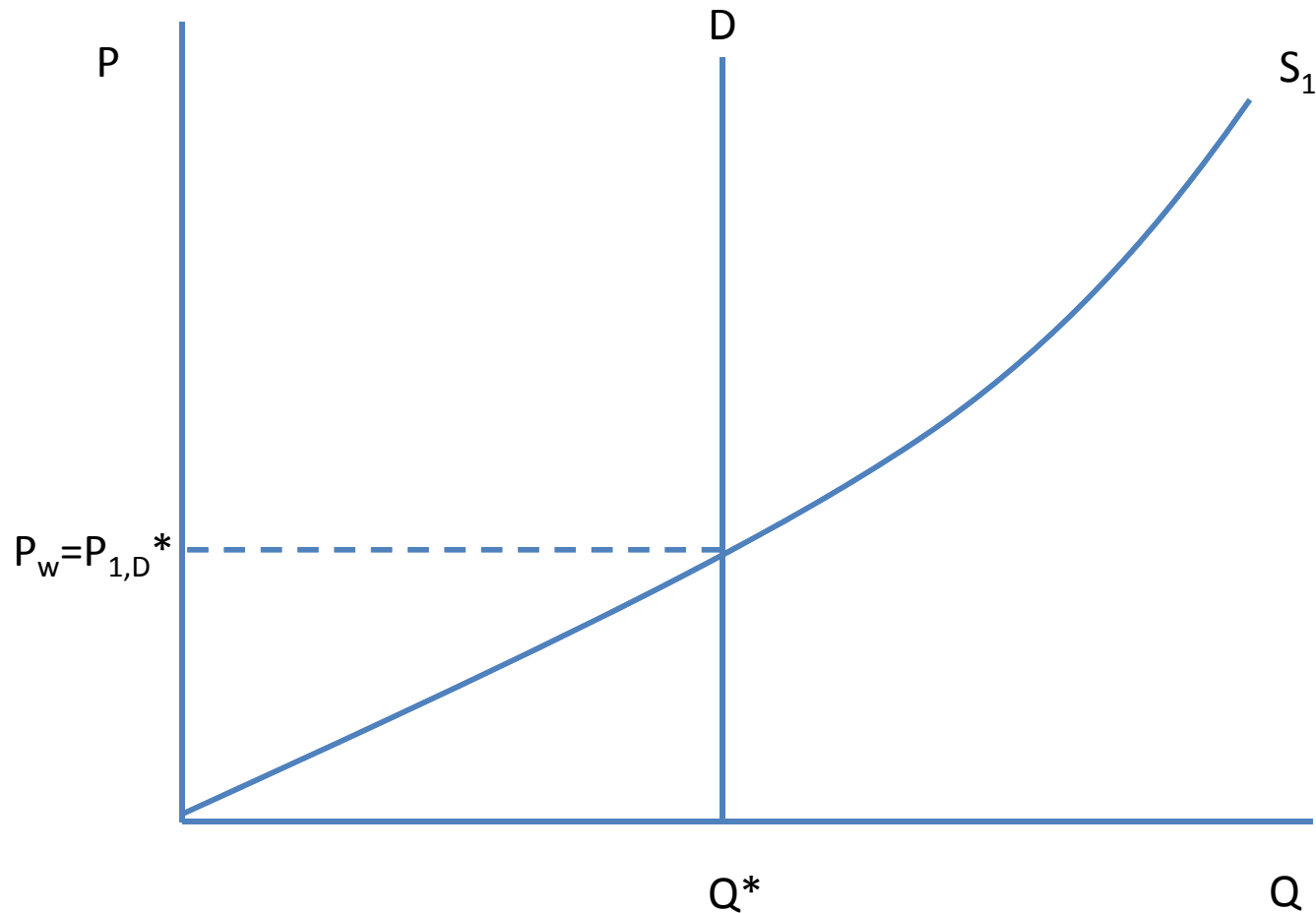
Unconventional Shale Plays have reversed a decades old trend of declining U.S. Oil Production

World and U.S. Oil Production

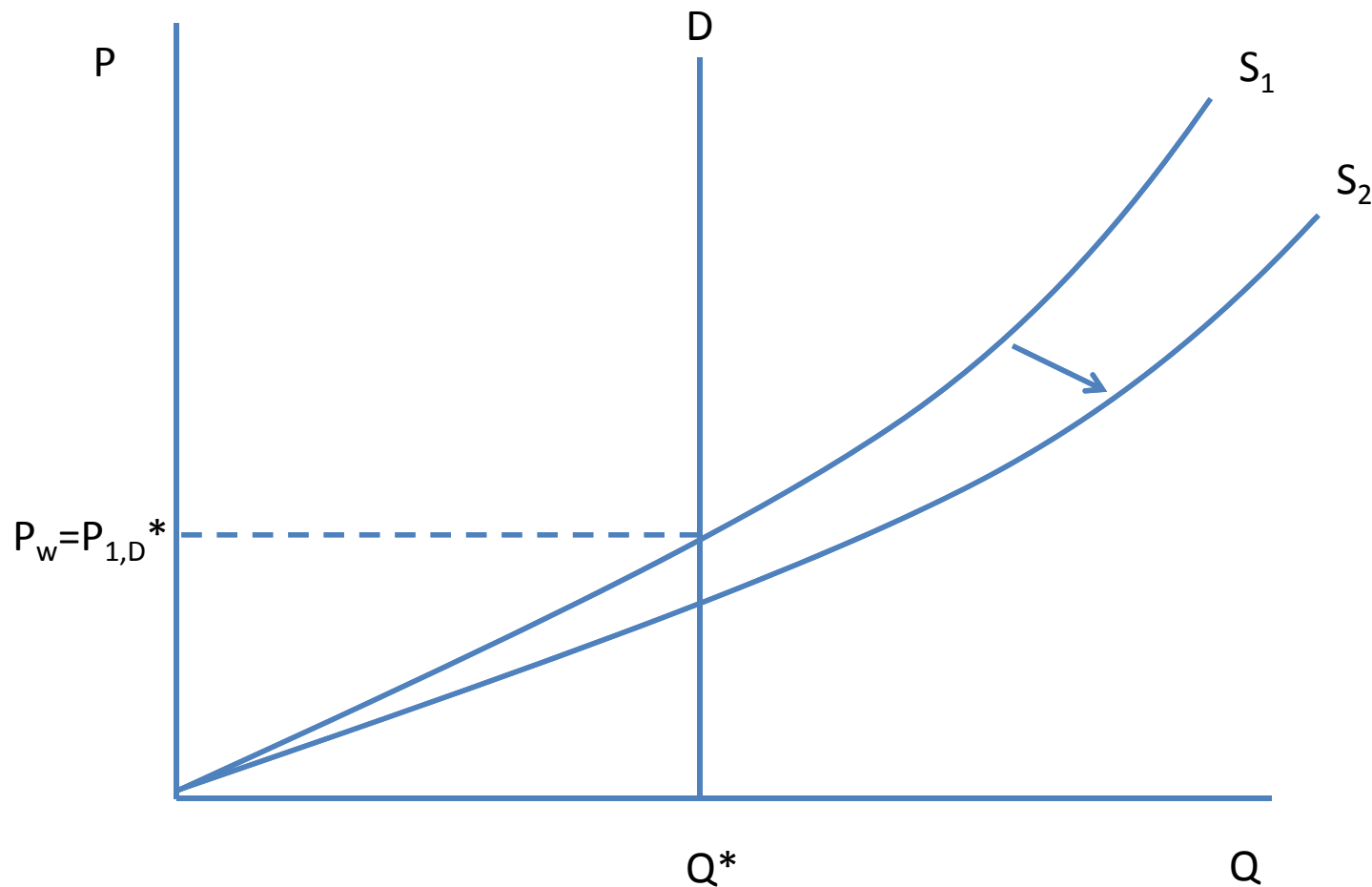


Model Predictions

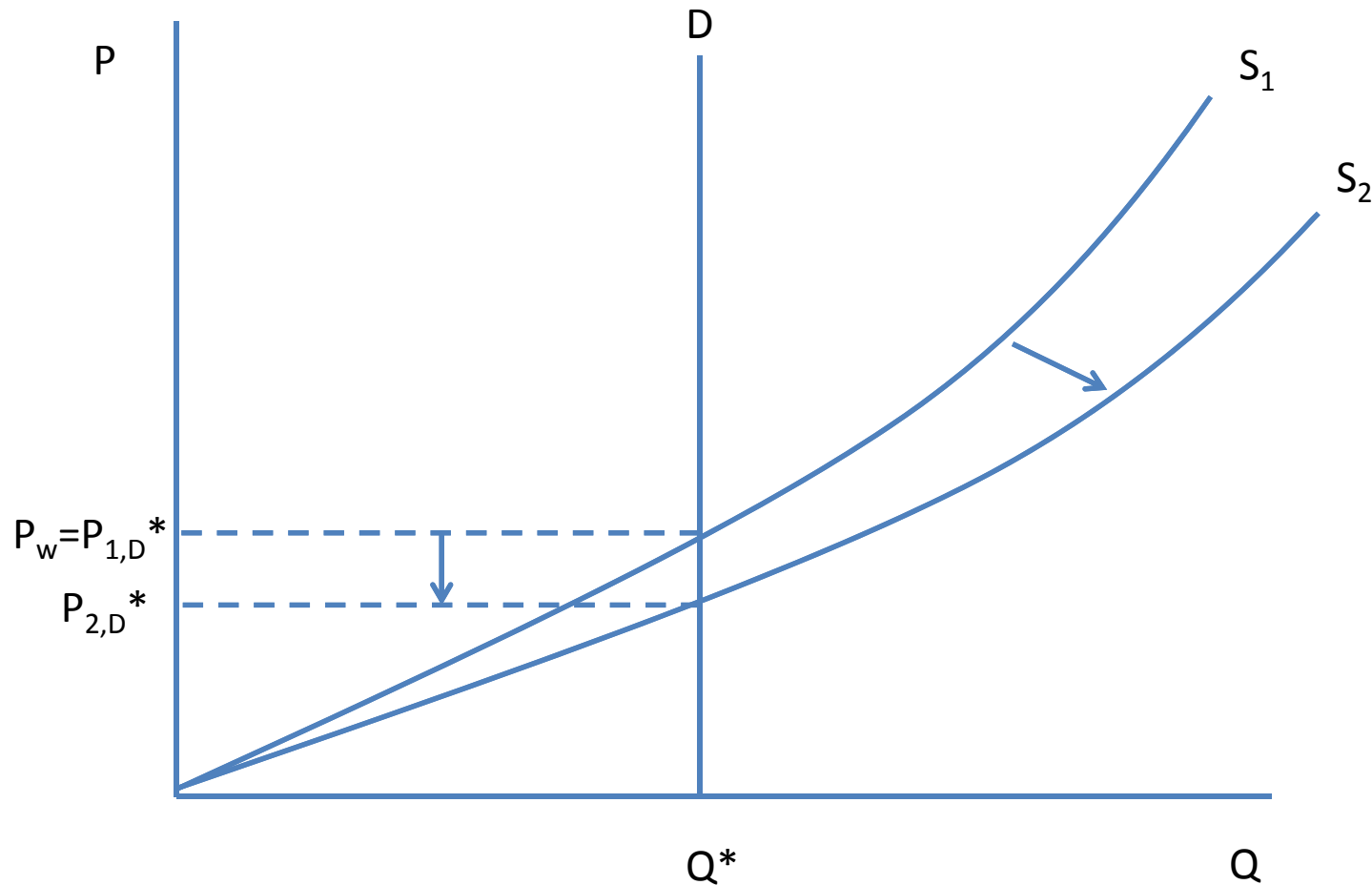
- **Historically, WTI has traded at a slight premium to Brent (due to quality difference and transportation costs).**
- **Shale oil has been almost exclusively concentrated in the United States.**
- **So what does economic theory predict will occur due to advent of this new production?**



We start of at the long run equilibrium where $P_w = P_{1,D}^*$.



Shale oil and gas came onto the market in the United States in 2007. This led to a sharp shift in supply of U.S. crude oil.



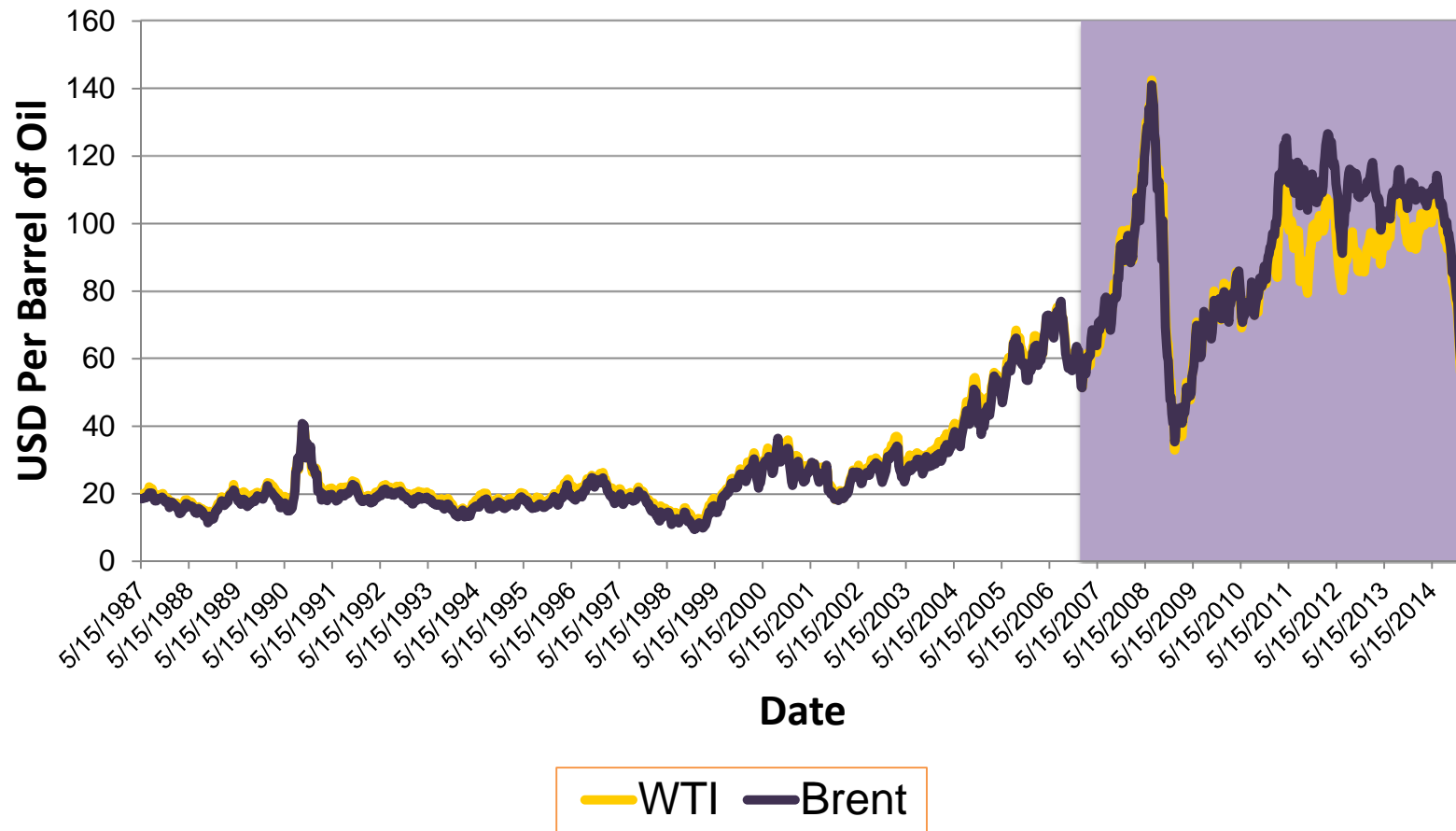
The supply shock leads to a sudden decrease in the domestic price both in absolute terms as well as relative to the global crude price.

Model Predictions

- **Theory predicts that the price of WTI will decline relative to Brent in the short run.**
- **In the long run, the two prices will converge once again.**
- **Does the data support the theory?**

WTI and Brent Crude Spot Prices – Pre and Post Shale

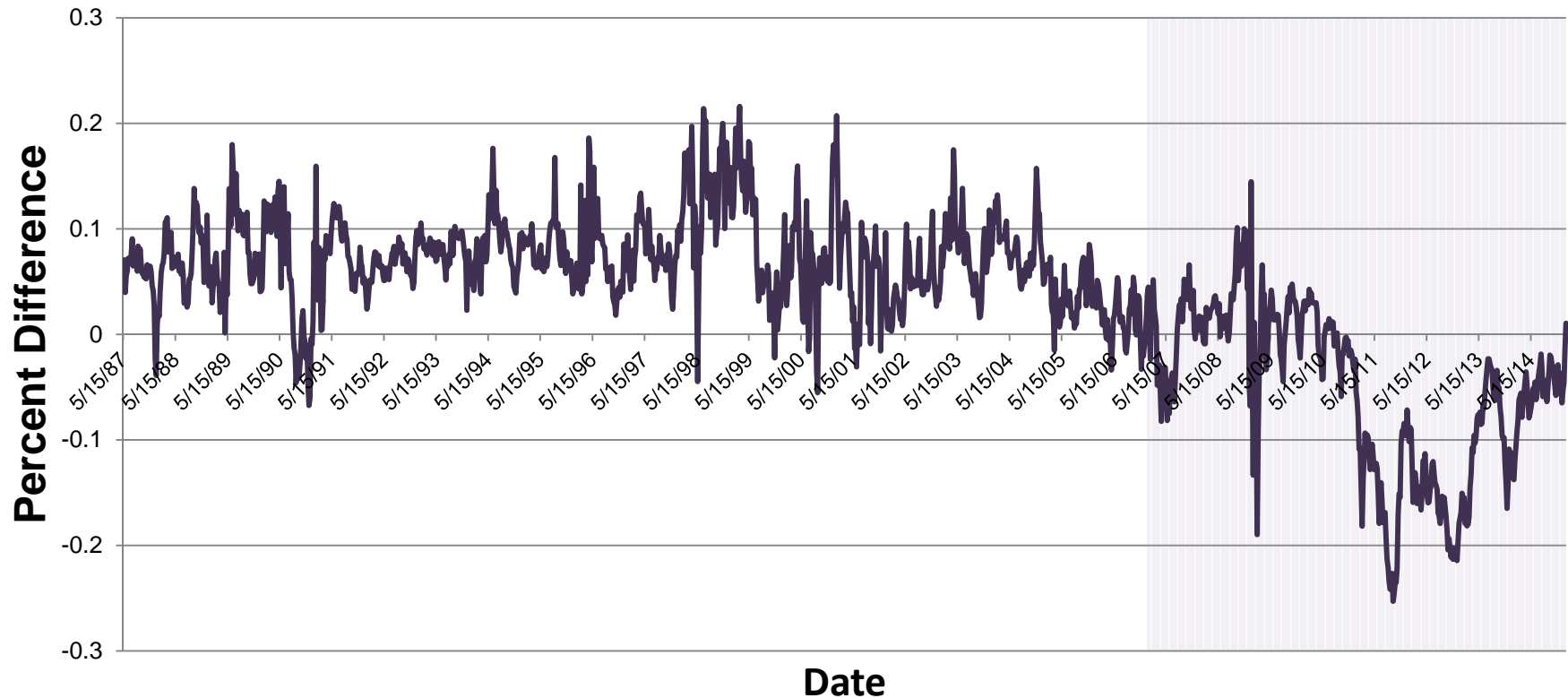
While WTI and Brent spot prices are still highly correlated, we have seen a significant divergence due to the advent of shale.



Price Differential Between WTI and Brent – Pre and Post Shale

For the first time in history, WTI trades at a discount to Brent for a significant amount of time.

Percent Difference Between WTI and Brent Spot Prices



Winners and Losers

- **Refineries – Winners**
 - **Because the refined product is globally traded, increases in global crude prices will lead to increases in refined product prices.**
 - **Refiners will be able to sell the refined product at the higher world price, but will have the advantage of purchasing unrefined product at the lower domestic price.**
- **Producers – Losers**
 - **If crude exports were allowed, then domestic oil producers would always sell at the world price, as the world price would always be the same as the domestic price (with adjustments for transportation and other frictions).**
 - **But, with export restrictions, if the global price is higher than the domestic price, then domestic producers will either have to:**
 - a) Store crude oil until price increases. (Current estimates suggest that more than 15 percent of current crude production is going into storage!)**
 - b) Sell product at low price (relative to world price).**

“Major oil companies are exporting refined products with no limitations. Why shouldn’t independent producers be allowed to do the same? . . . This would be equivalent to telling American farmers they can’t export their wheat, yet allowing Pillsbury to export all the processed flour they want.”

- Harold Hamm, CEO Continental Resources

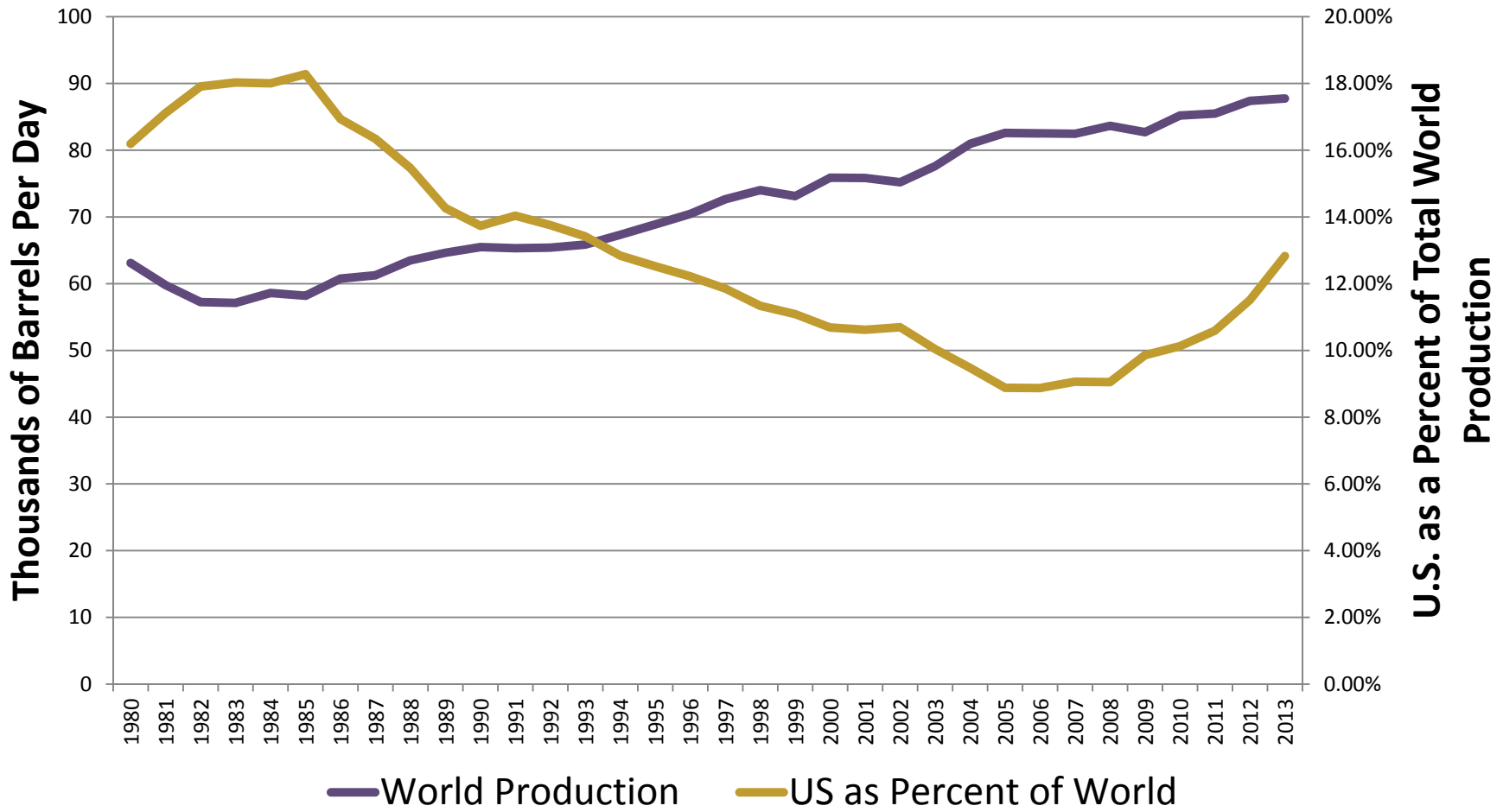
- **Consumers– Neither!**
 - Recall, that consumers do not actually consume crude directly—they consumer the final products created from crude, such as gasoline. Refined products are traded on the global market and are therefore subject to the global price.
 - A recent IHS study estimates that crude exports will actually *decrease* prices for consumers under current market conditions.
 - Export Restrictions Lifted → ↑ Domestic Production →
↓ Global Crude Prices → ↓ Global Gasoline Prices

The Future of Global Oil Markets

- Thus far, we have only considered the supply side of the domestic market for petroleum products.
 - Note: While refiners are the demanders of crude oil, the demand for their refined product is what drives refiner demand in the long run.
- So to understand the future of global oil markets, we need to consider both global supply and global demand of both crude oil and refined products, such as gasoline.

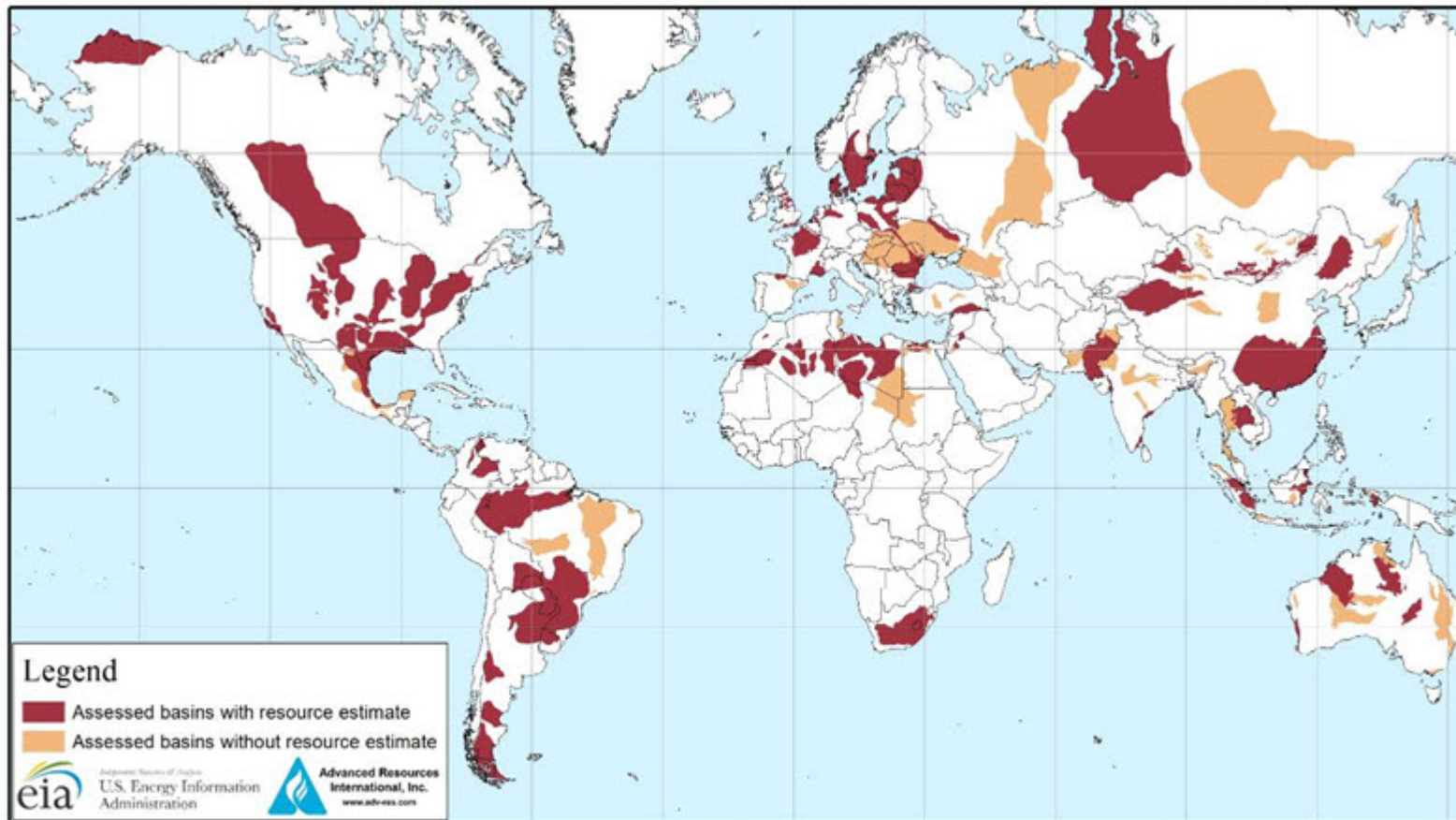
The Supply Side

World Crude Oil Production

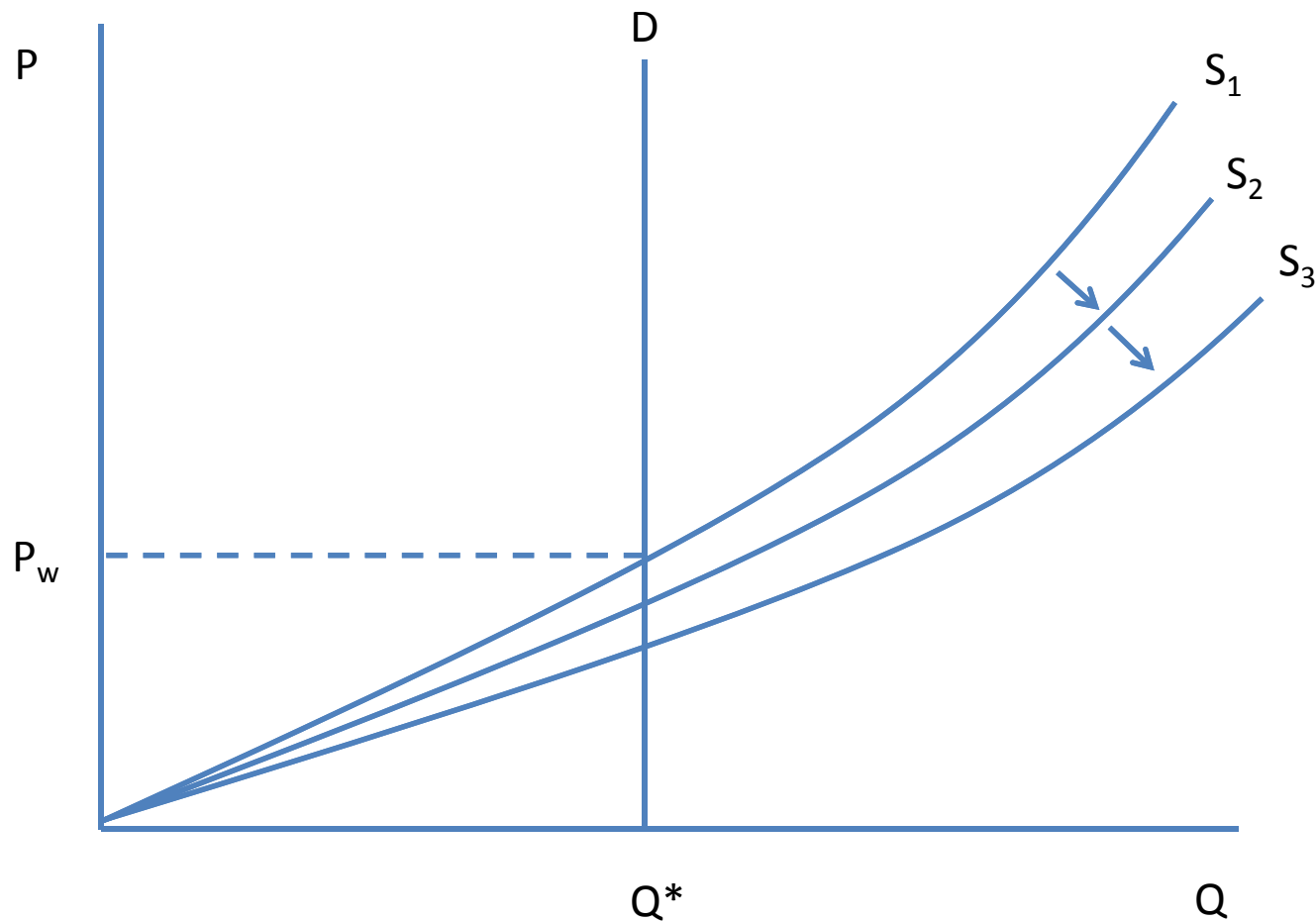


The Supply Side - Global Shale Basins and Plays

Figure 1. Map of basins with assessed shale oil and shale gas formations, as of May 2013



Source: United States basins from U.S. Energy Information Administration and United States Geological Survey; other basins from ARI based on data from various published studies

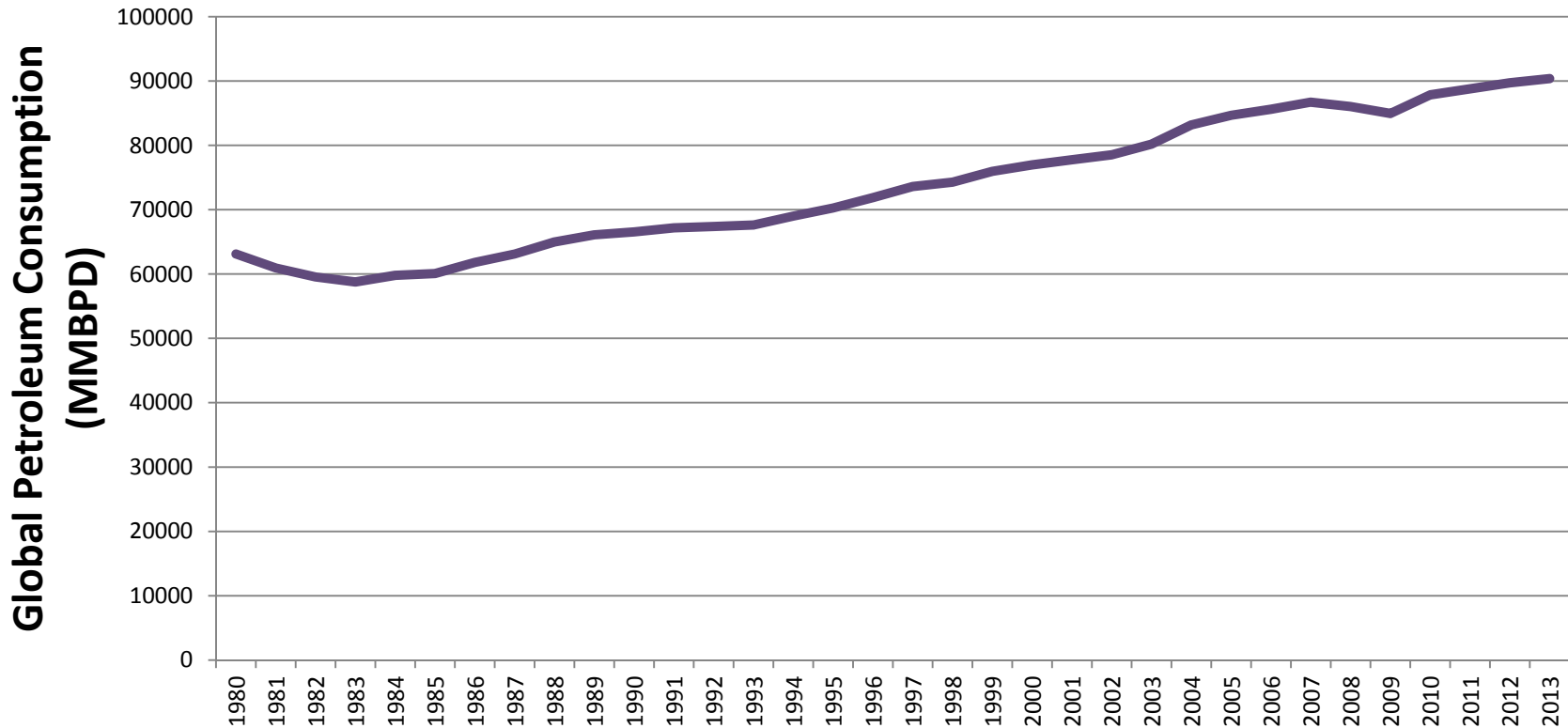


As more oil is discovered and drilling costs continue to decline, the world supply of crude will shift outward.

Global Petroleum Consumption

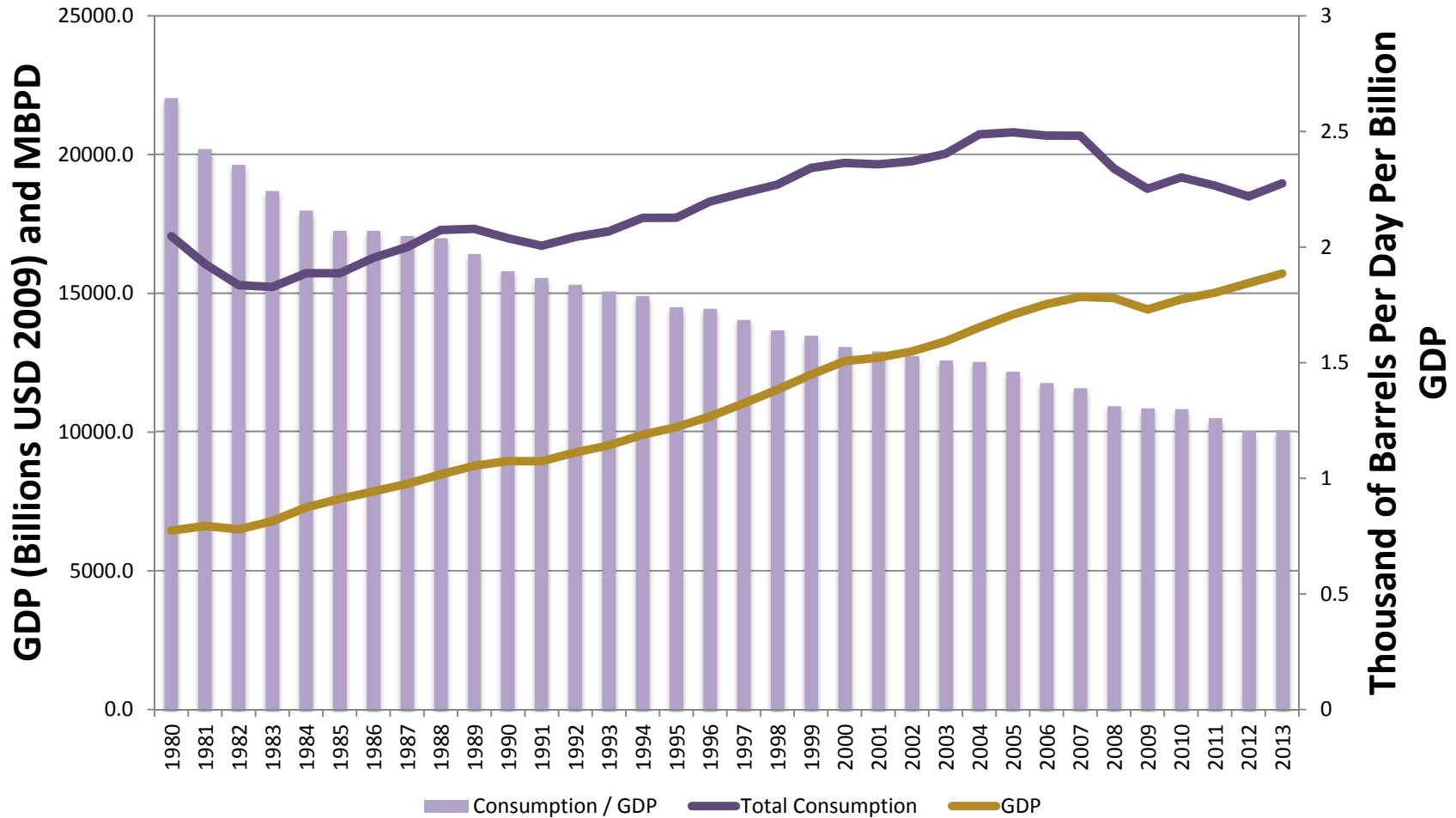
Global Petroleum Consumption has been consistently increasing for the past 30 years.

World Petroleum Consumption



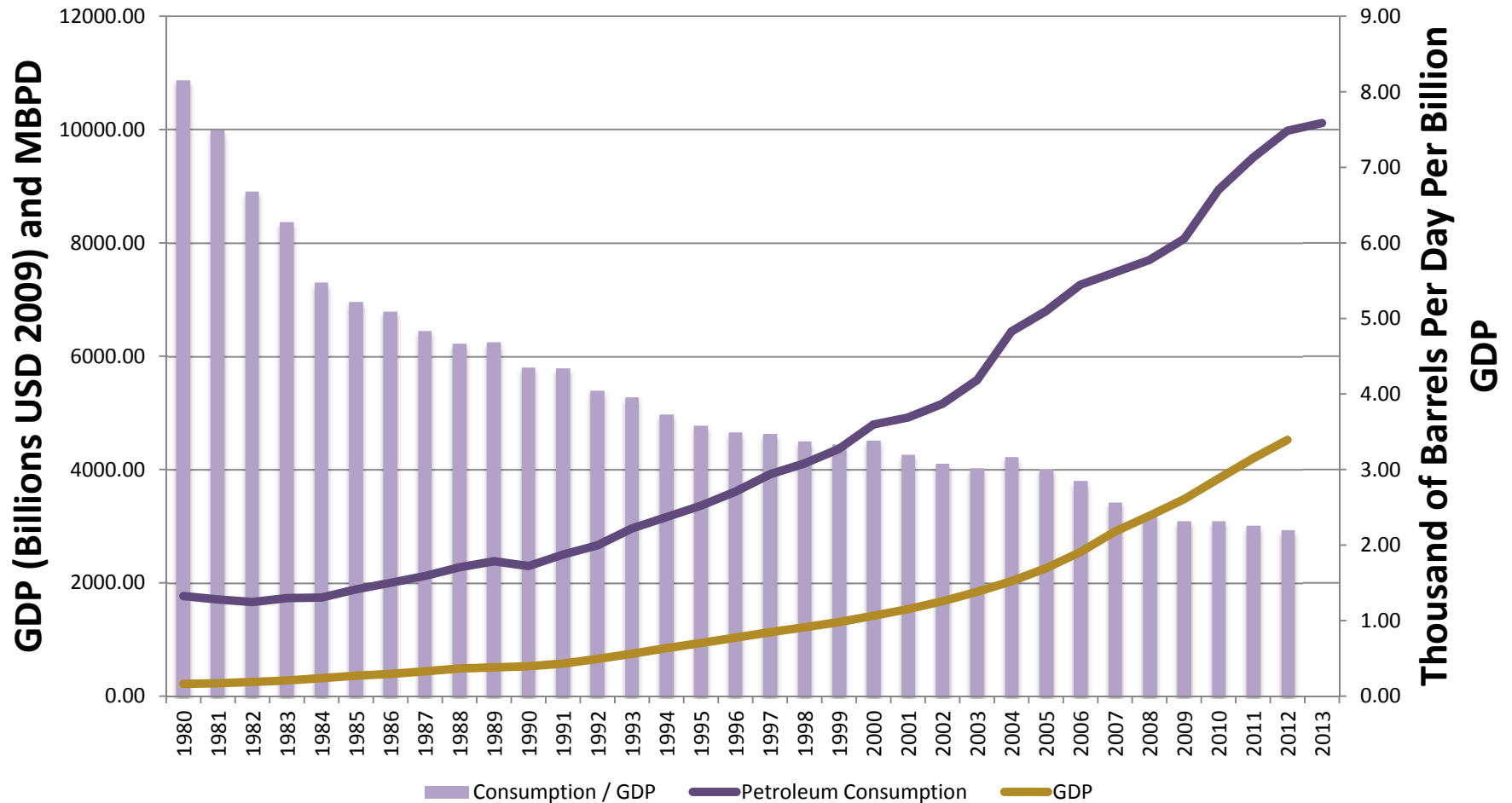
Global Petroleum Consumption

U.S. Petroleum Consumption and GDP



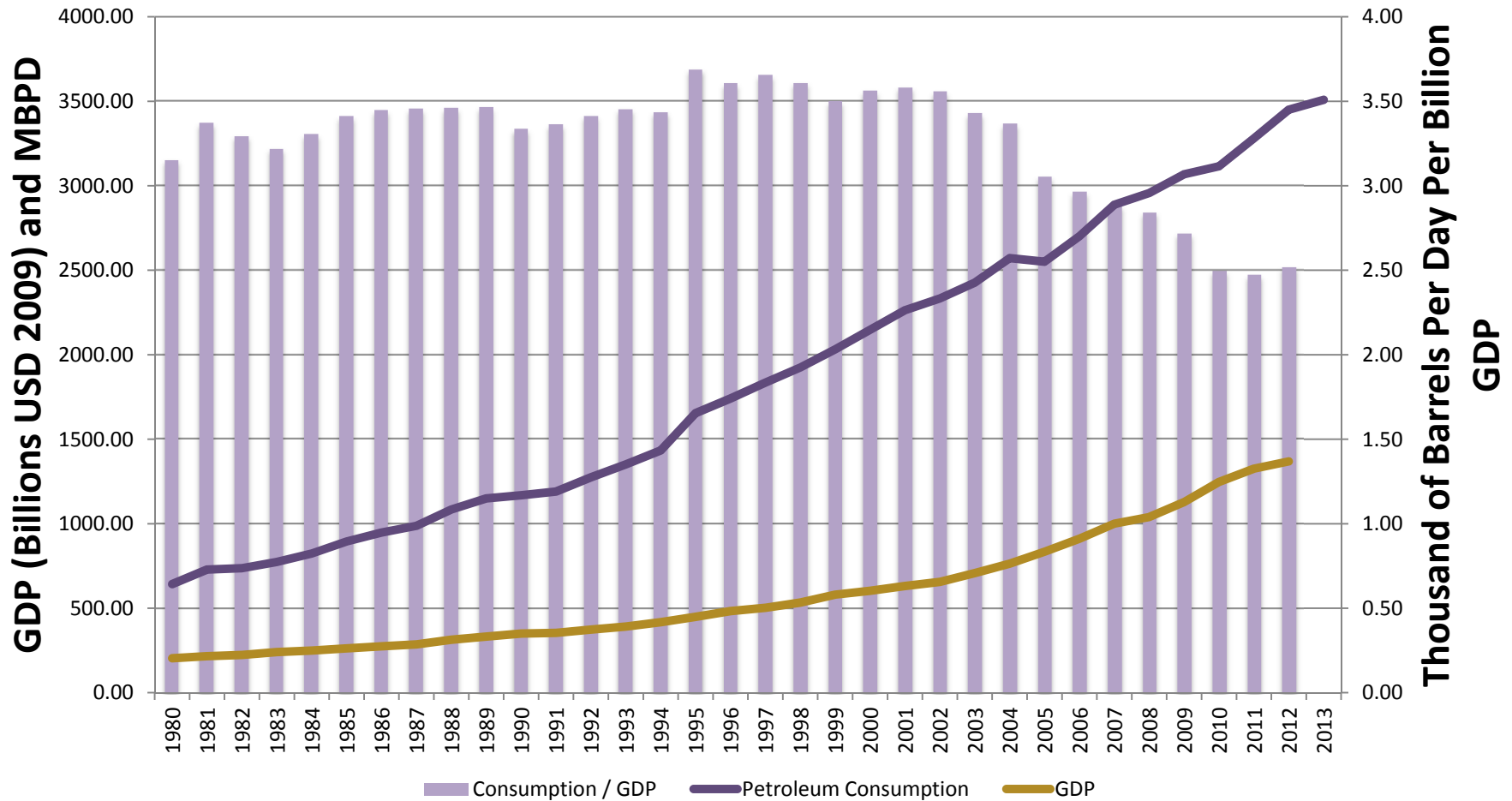
Global Petroleum Consumption

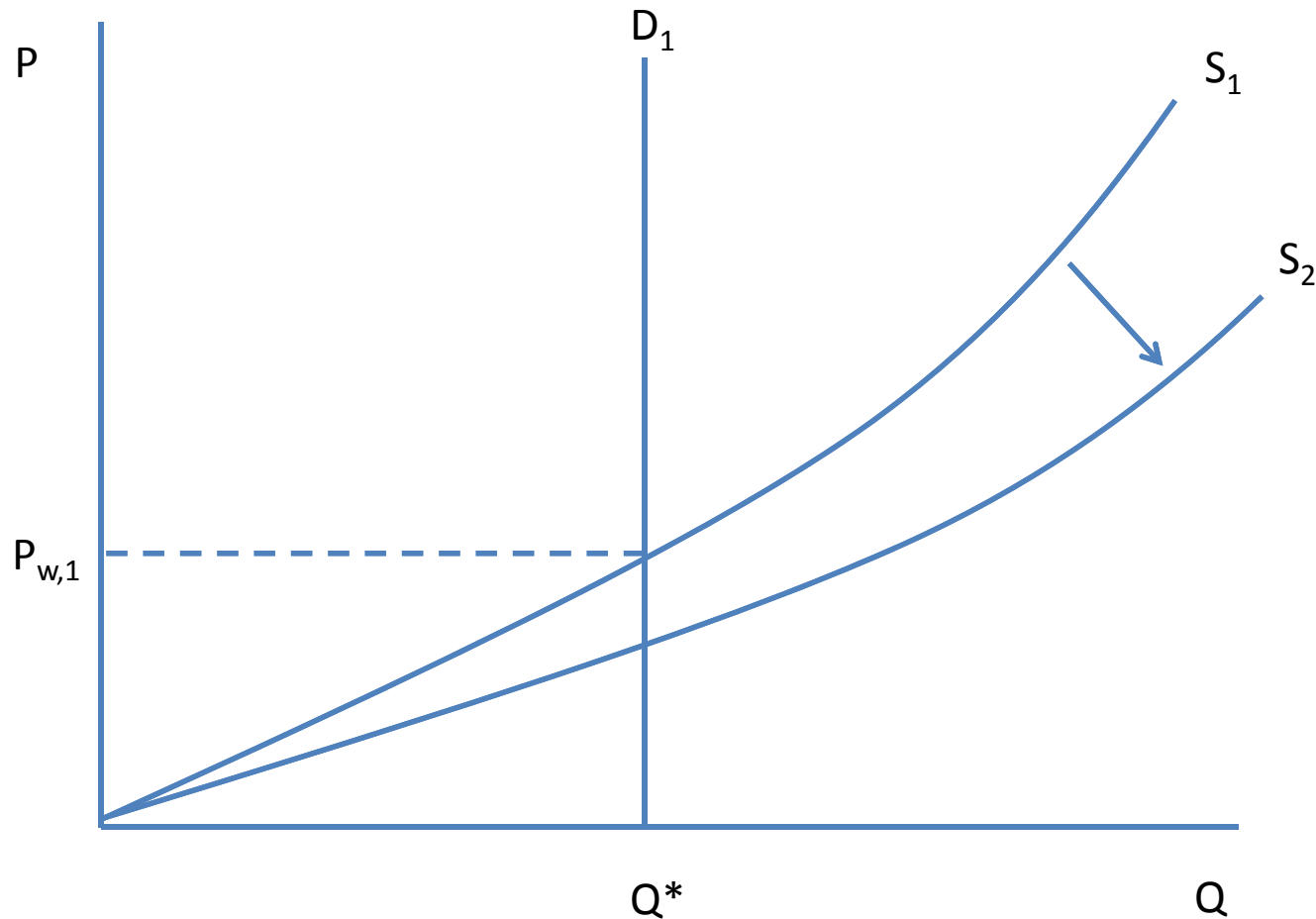
China Petroleum Consumption and GDP



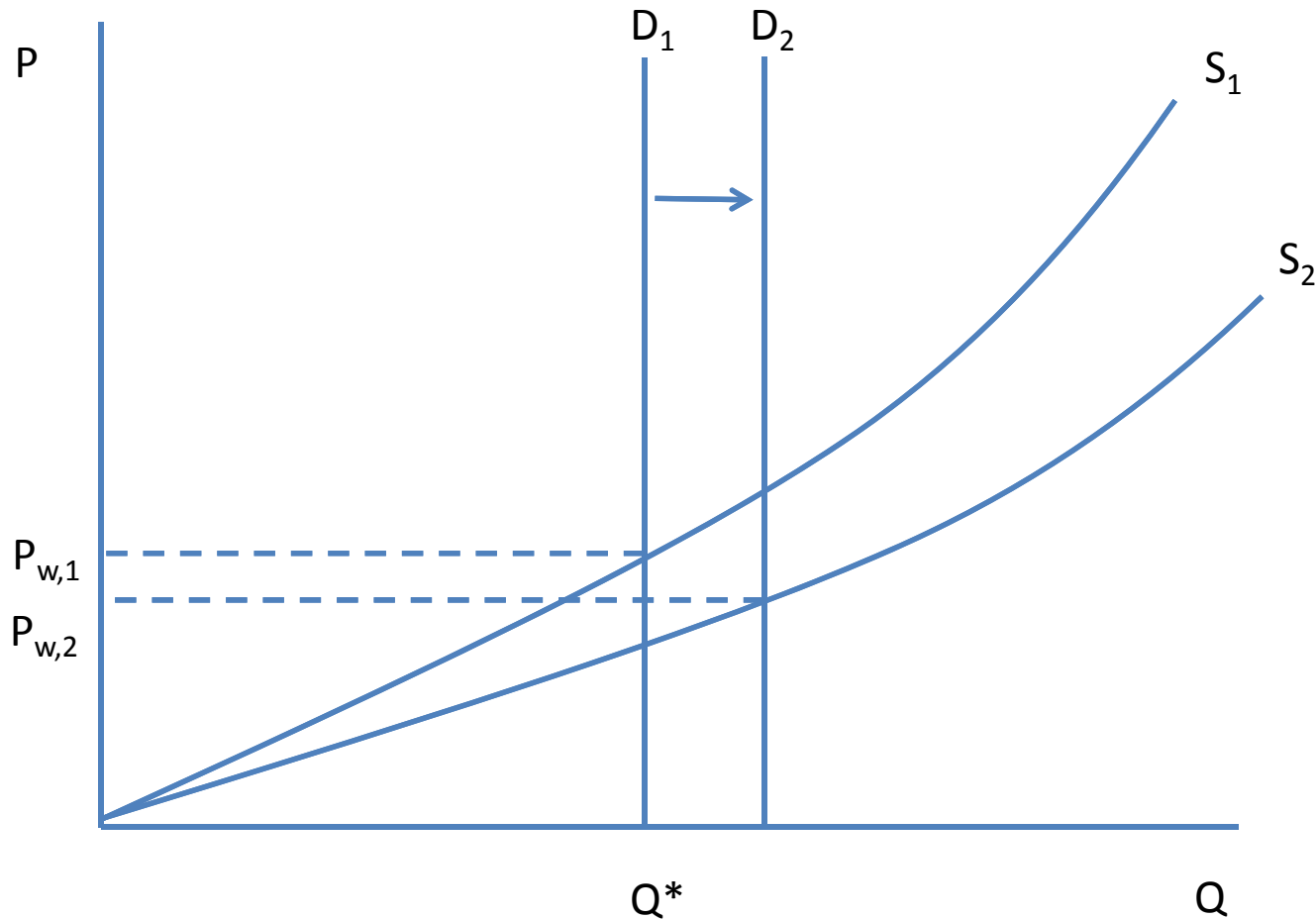
Global Petroleum Consumption

India Petroleum Consumption and GDP





As more oil is discovered and drilling costs continue to decline, the world supply of crude will shift outward.



Global demand for crude is ultimately determined by the demand for final product and will continue to rise. Because current supply growth is outpacing demand growth, current prices are decreasing.

Conclusions

Long run implications

- **If U.S. crude supply continues to increase relative to refining capacity, this will push for additional investment in domestic refining.**
 - **If export restriction is removed, this new refining could go elsewhere.**
- **In the long run, the U.S. crude price will converge to the global price, but producers will always be subject to detrimental transitory shocks.**

Questions?