

The Implications for the Timber Sector of US Biofuel Mandates

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The Timber Supply Model

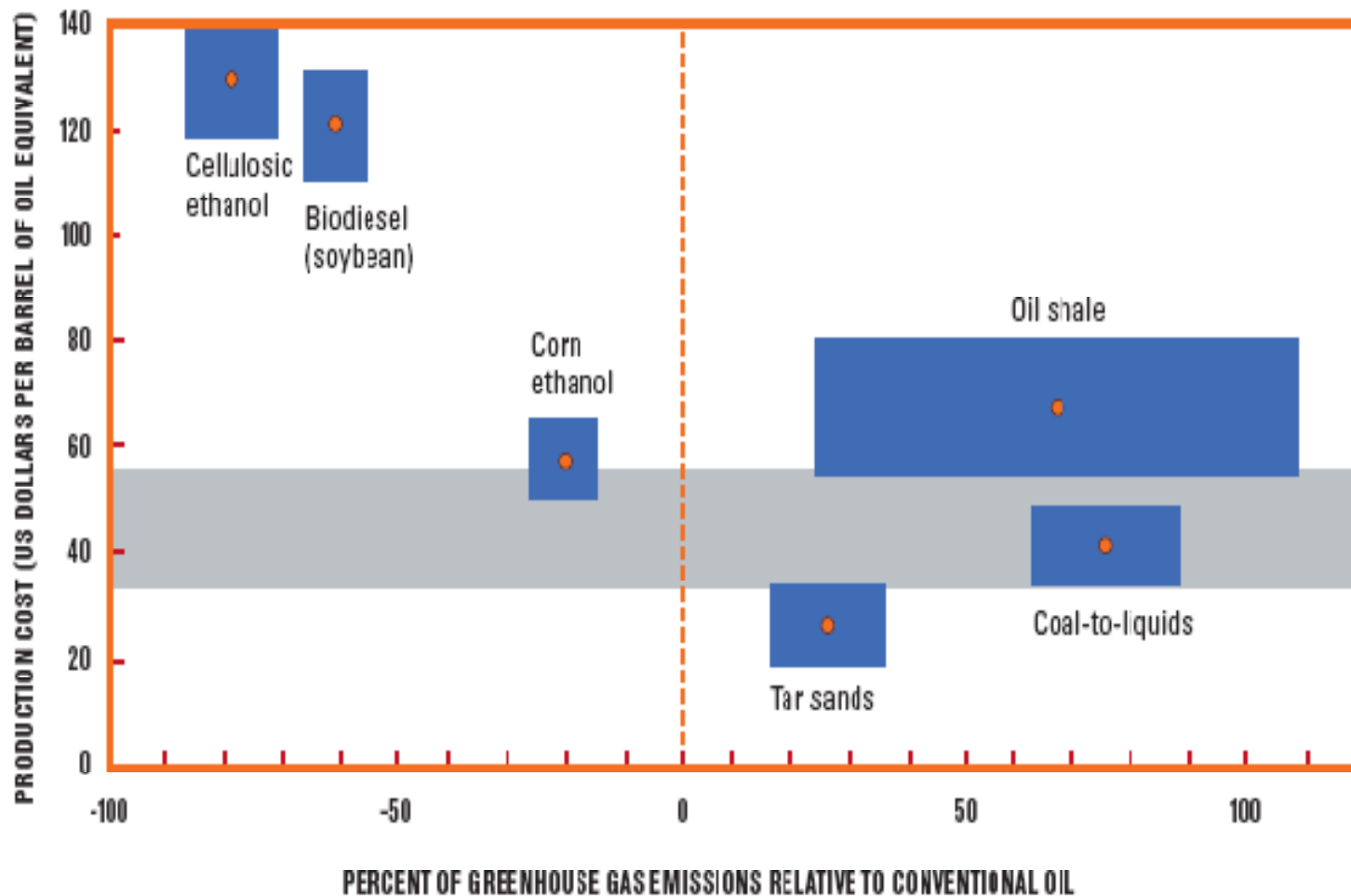
- Basic model Sedjo and Lyon (1990)
- Updated: Sohngen, Mendelsohn and Sedjo (1999)
- Modified to look at forest carbon, “Global Forest Carbon Model,” host of applications.
- Modified to examine effects of climate change on forest. Sohngen, Mendelsohn and Sedjo (2001).
- Land use model including forest and agriculture

Applications

- Used to analyze global timber supply;
- exchange rate competitiveness of the US timber sector; (Daigneault, Sohngen and 2007)
- Forest Carbon
- Land use modeling, including forestry and agriculture land uses.
- Biofuels are next

Wood Energy: Possibilities

- Ordinary combustion
- Wood pellets – substantial market, currently using an estimated 10 million M3.
- Liquid biofuels
 - **Ethanol**, etc. (fermentation, thermochemical)
 - Repurposing pulpmills for ethanol or biocrude, e.g., Phillips (NCS), Larsen (Princeton)



Oil Alternatives: Costs and Emissions Vary Widely

- High and low range of costs and emissions
- Range of most crude oil price forecasts over next 20 years

Source: Costs. U.S. Energy Information Administration, *Annual Energy Outlook* (2006), other sources. Emissions. A. Brandt and A. Farrell (2006), M. Wang (GREET model 2006).

Energy Act of 2007

- Targeted mandates into 2022.
- The [Energy Independence and Security Act of 2007](#) requires American “fuel producers” to use at least 36 billion gallons of biofuel in 2022. The law sets a modified standard that starts at 9.0 billion gallons of renewable fuel in 2008 and rises to **36** billion gallons by 2022. Of this total, **21** billion gallons are required to be of advanced biofuel with **cellulosic biofuel making up 16 billion of the total.**
- Creates a new set of subsidy incentives, e.g, **\$1.04/gallon of cellulosic biofuel.** While decreasing the corn ethanol subsidy from \$0.51 to \$0.45.

Applicable volume of cellulosic biofuel

Year	Billions gallons	M3 millions
2010.....	0.1	2.0
2011.....	0.25	5.0
2012.....	0.5	10.0
2013.....	1.0	20.0
2014.....	1.75	35.0
2015.....	3.0	60.0
2016.....	4.25	85.0
2017.....	5.5	110.0
2018.....	7.0	140.0
2019.....	8.5	170.0
2020.....	10.5	210.0
2021.....	13.5	270.0
2022.....	16.0	320.0

Adequacy of Existing Wood Supply

- The harvest levels needed to supply the both the new biofuel industry would be huge.
- The wood required for the **2022 biofuel feedstock would need to equal to 320 million m³ or 66%** of the US 489 million m³ 2005 harvest (FAO2006).
- It is clear from these figures that although in concept US forests could sustain such an increase in the physical harvest, the dislocations would be substantial.

Note: Other feedstocks, e.g., switchgrass, could be used

Figure I

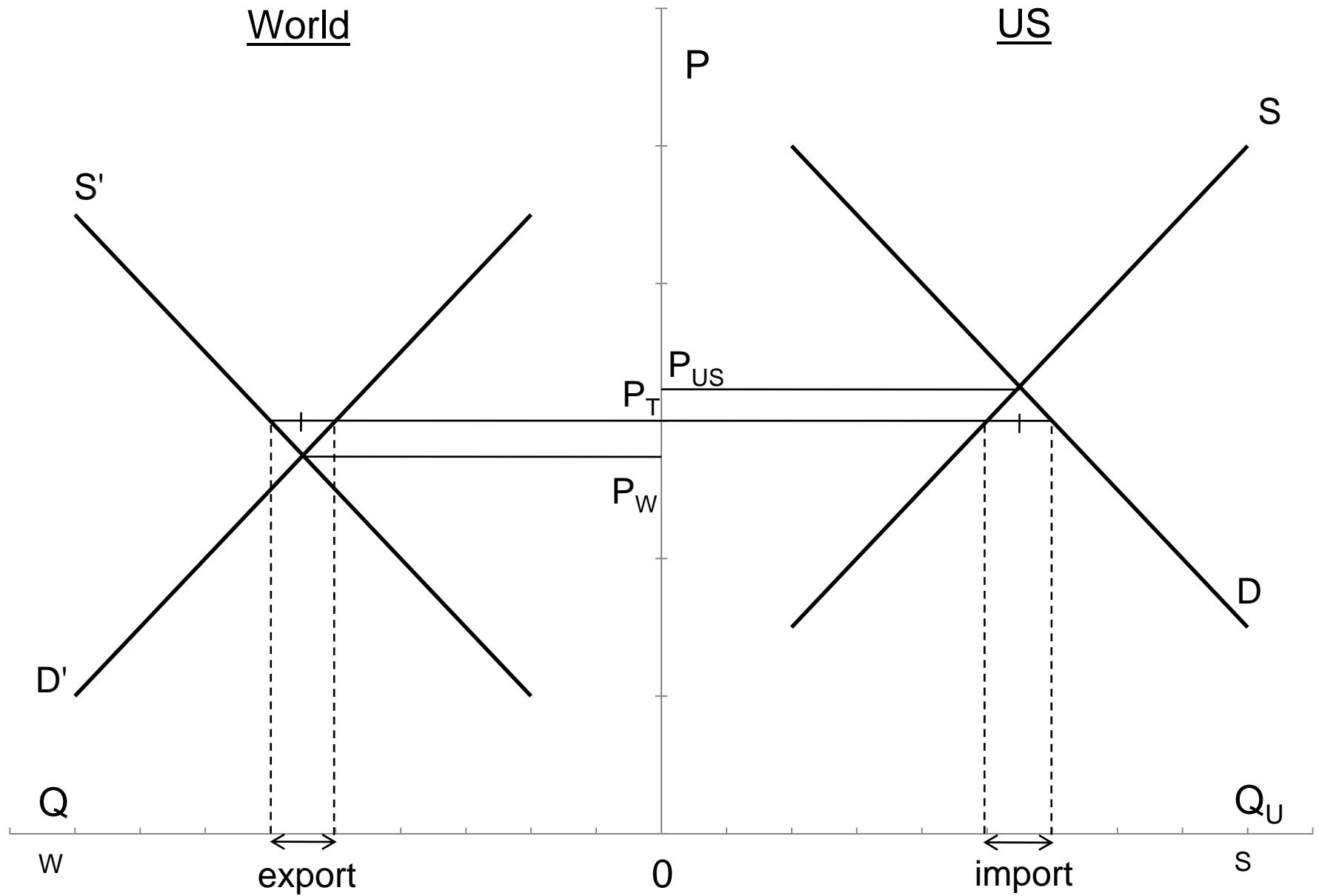
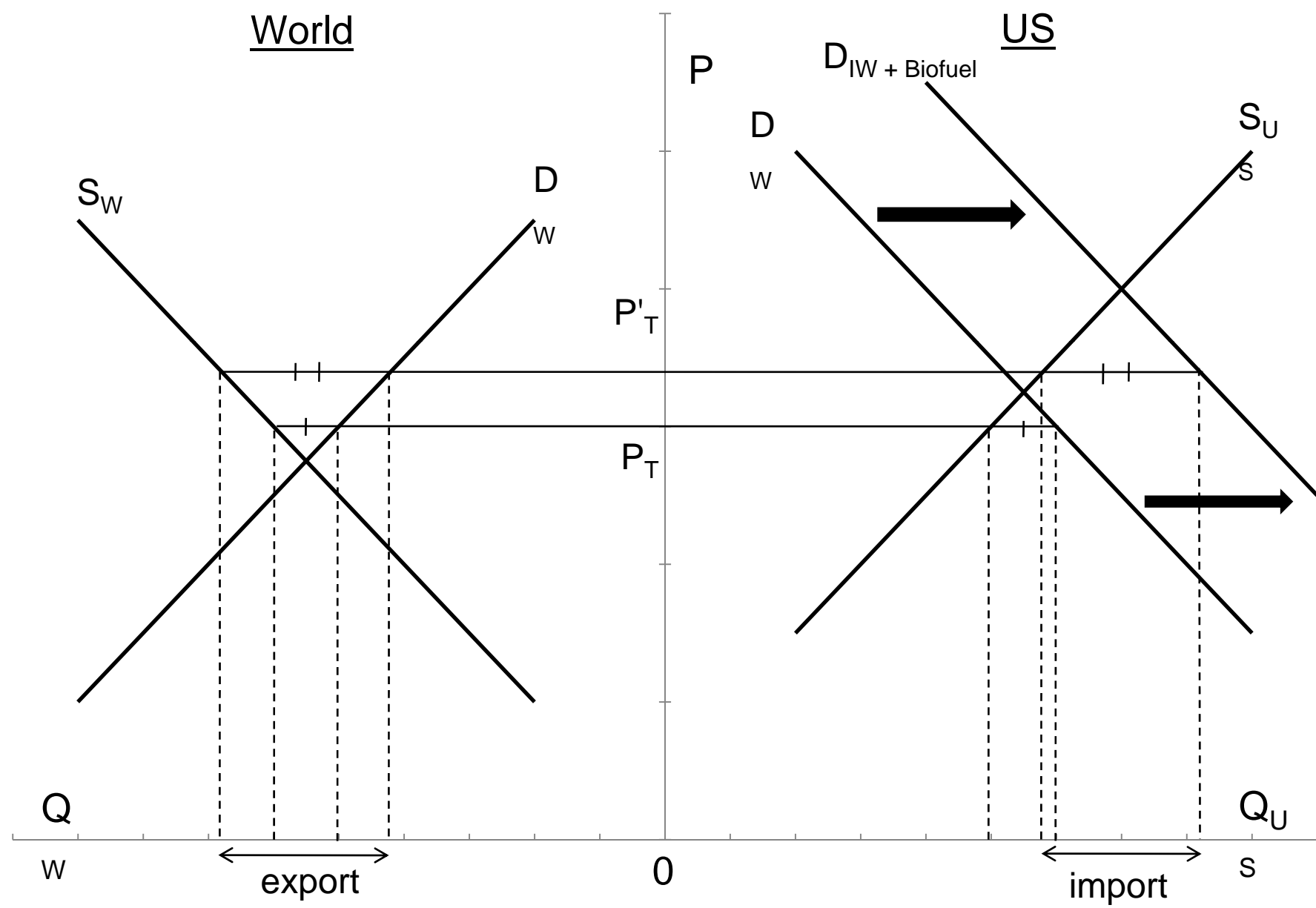


Figure II



Pressure on wood supply

- Liquid cellulosic biofuels could substantially increased demand for wood.
- Over short term might expect domestic prices of wood. e.g., pulp logs, to rise dramatically.
- Over longer term might expect more domestic wood to biofuels and increased imports of industrial wood and wood products. So,
- Would expect that some new wood requirements met by **decreased exports and increased imports** of industrial wood products.
- Summary: U.S. would decrease its production of industrial wood products as it uses more of its wood base for biofuels

Energy Act: More problems

Constraints on the use of wood.

- **Wood harvested from the federal forest system is discouraged from being utilized for liquid energy through the explicit absence of the renewable energy credit for users of biofuels produced using wood from federal lands.**
- Section 201 of the Energy Policy Act of 2007 contains a very restrictive definition of "renewable biomass" for the purposes of meeting the goals of the Renewable Fuel Standard.
 - No biomass from forests on federal lands is allowable.
 - **From private forests, only "planted" trees are allowed--so** general forest area, and even areas of actively managed forests regenerated naturally cannot be included. Slash and materials from pre-commercial thinnings are allowed--but only from nonfederal lands.
- **Also, since only planted trees are allowed, much of the private forest is not available for biofuels feedstock.**

Implications and questions

- Financial viability of wood energy dependent on price of oil (energy), government mandated use, and carbon penalties (or credits), alternative biofuels, as well as wood ethanol processing costs.
- Current legal limitations on which forests are eligible for credits place pressures on the private planted forests. But fungibility domestically and internationally.
- **As demand for wood biofuel feedstock is added to traditional demand for industrial wood, would expect an overall increase in wood prices and costs to industrial wood processors.**
- Should make private plantation wood more valued in the market.
- Fundamental question: In the longer term, are biofuels a permanent solution or transitory phenomena? Biofuels will have to compete with electric vehicles, fuel cells, etc., as a future transport fuel.