
Uncertainty about Indirect Effects of US Ethanol on Brazilian Land Use

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What are the indirect effects of US biofuels?

- Indirect effects
 - Feedstock use
 - Market effects
 - Land use

 - Studies
 - Partial equilibrium
 - General equilibrium
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Models

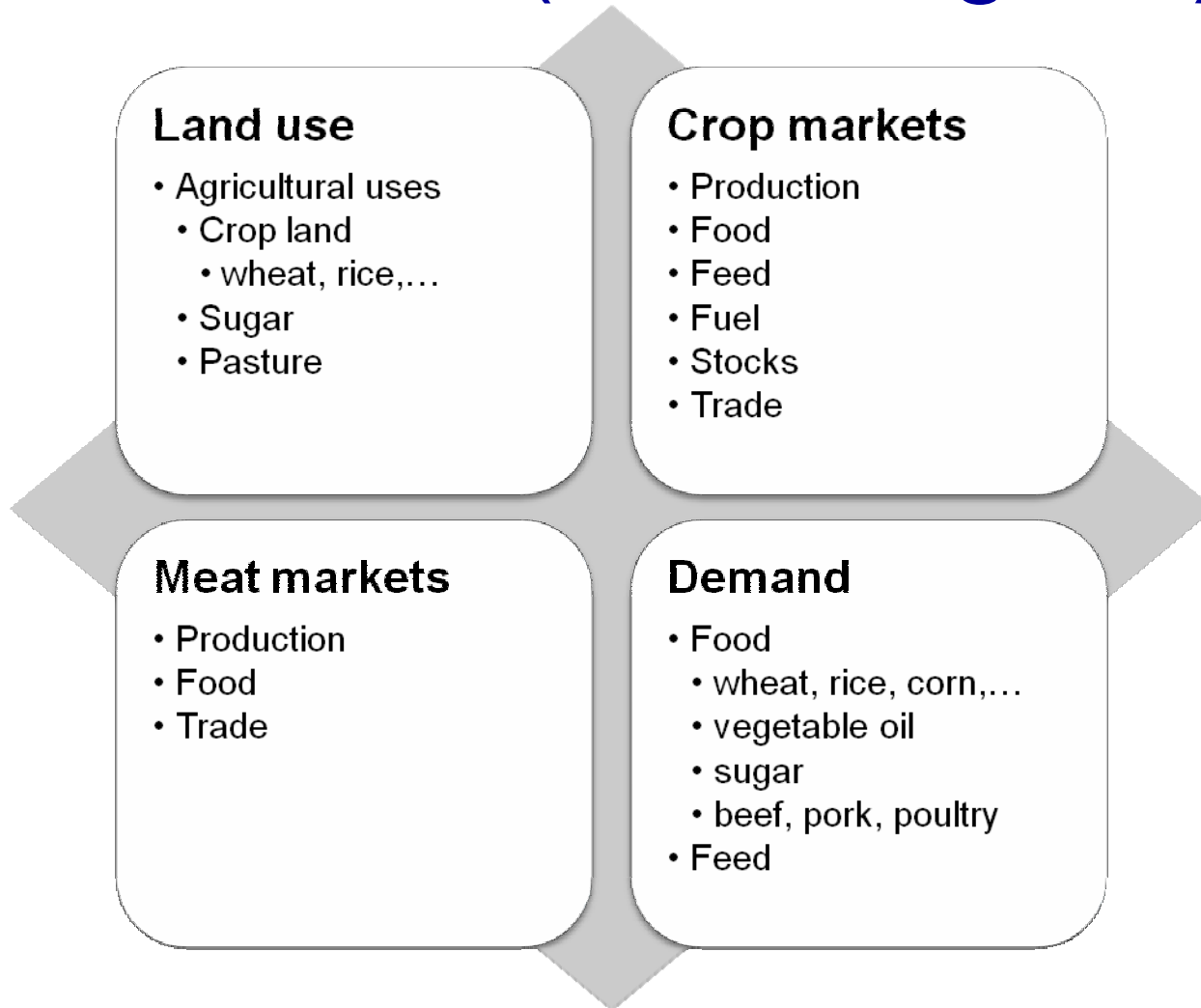
US model

- **FAPRI-MU US agricultural and biofuel markets**
 - national crop and milk supplies
 - no reduced form for trade

World model

- **Standardized representation**
 - Brazil, Argentina, China, India, Indonesia, EU, and Mexico; and rest of world trade
 - wheat, rice, corn, other coarse grains, sugar, soybean, rapeseed, sunflower, palm oil, vegetable oil, oilseed meal, beef, pork, and poultry; and ethanol

Standard agricultural market representation (excluding US)



Partial equilibrium, world markets

Commodities

wheat
rice
corn
other coarse grains
vegetable oil
oilseed meal
sugar
beef
pork
poultry
ethanol

Countries, regions

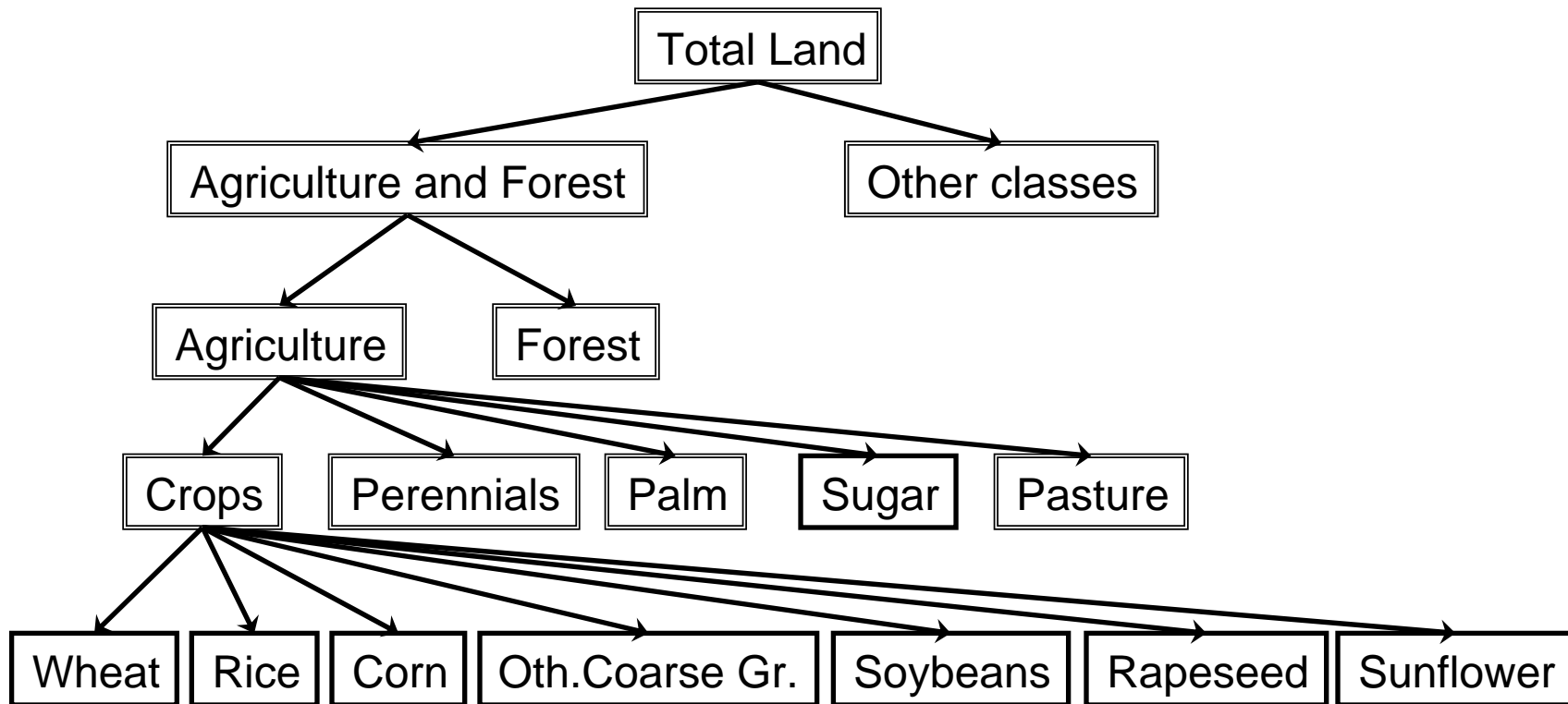
US
Brazil
Argentina
China
India
Indonesia
European Union
Mexico
rest of world



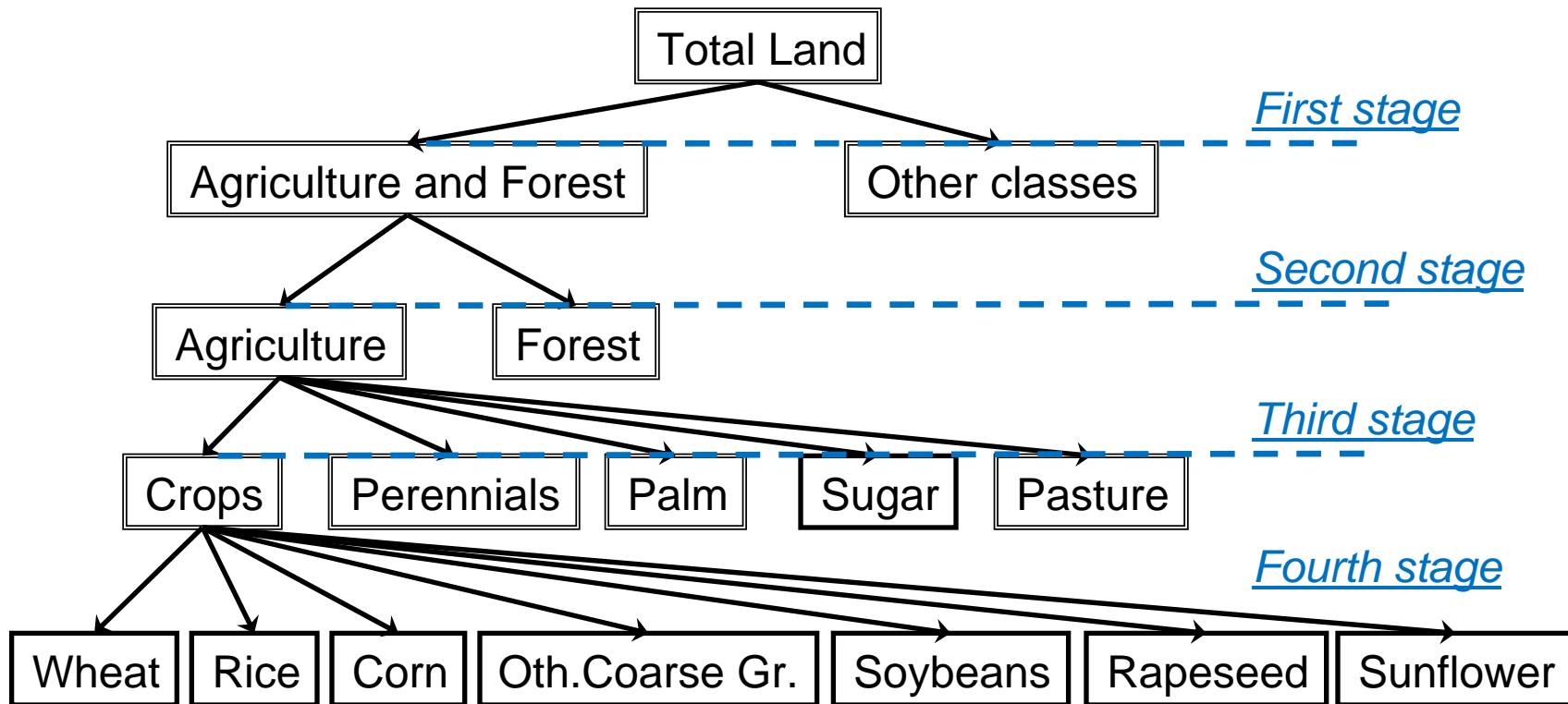
US ethanol model

- Ethanol demand
 - Additive
 - E10
 - E85
 - Supply capacity building and use
 - Policy
 - Tax credits and tariffs
 - EISA mandates
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Standard land allocation (not US)

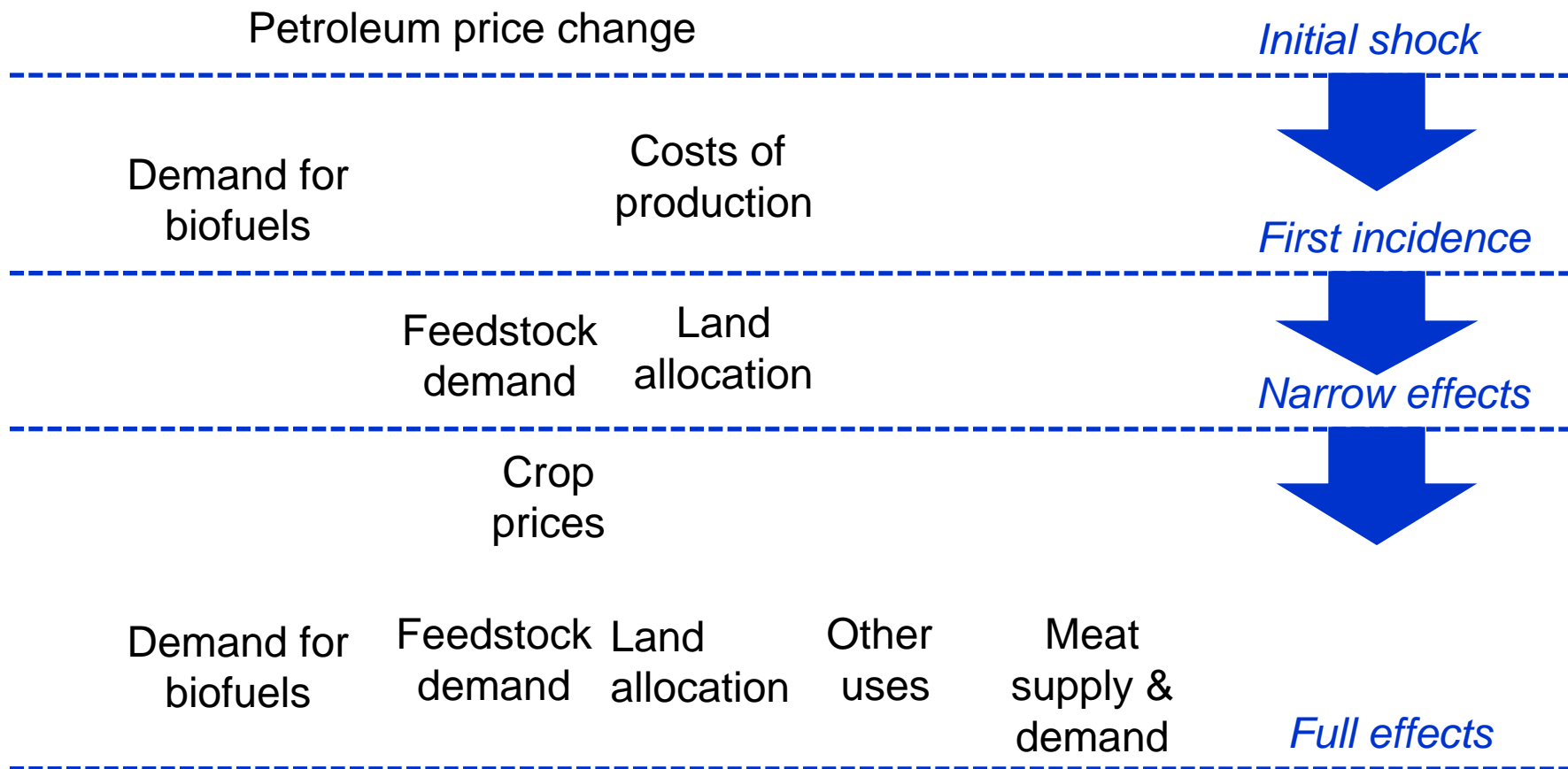


Land allocation elasticities

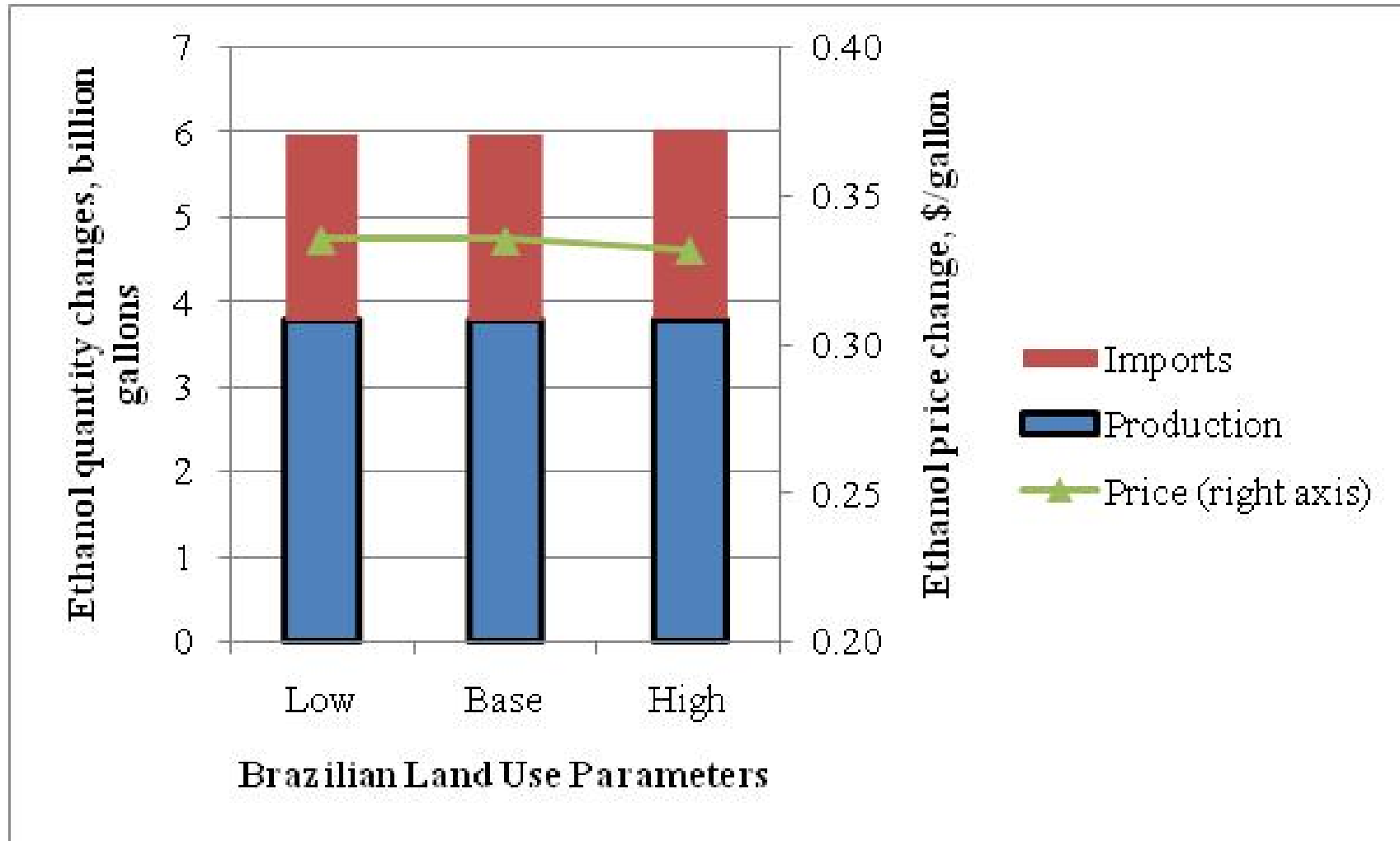


	Low	Base	High
First stage	0	0.05	0.10
Second stage	0	0.10	1.00
Third stage	0.075	0.15	1.00

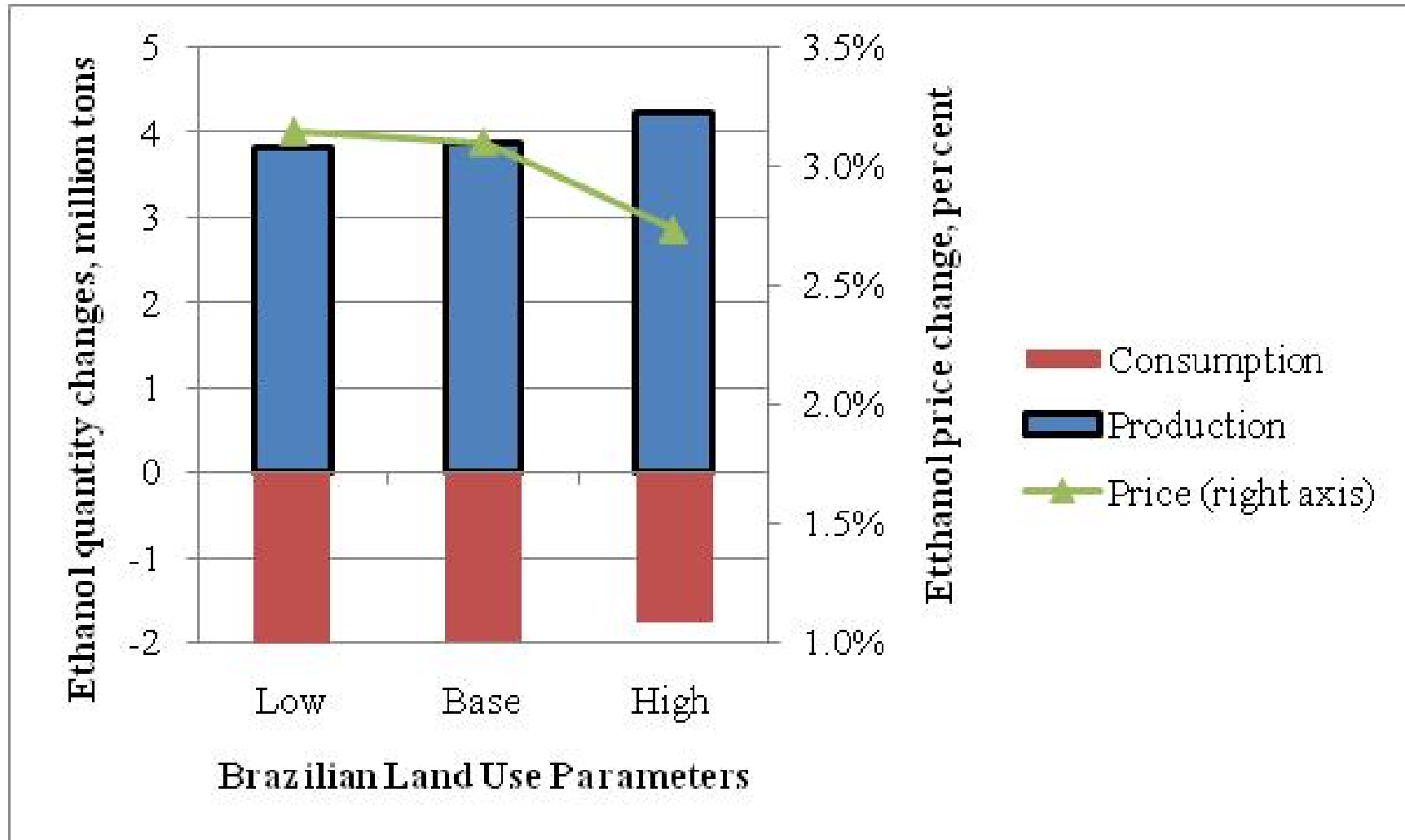
Petroleum price change effects from US perspective only



Petroleum from \$125 to \$160: Effects on US ethanol market



Petroleum from \$125 to \$160: Effects on Brazil ethanol market



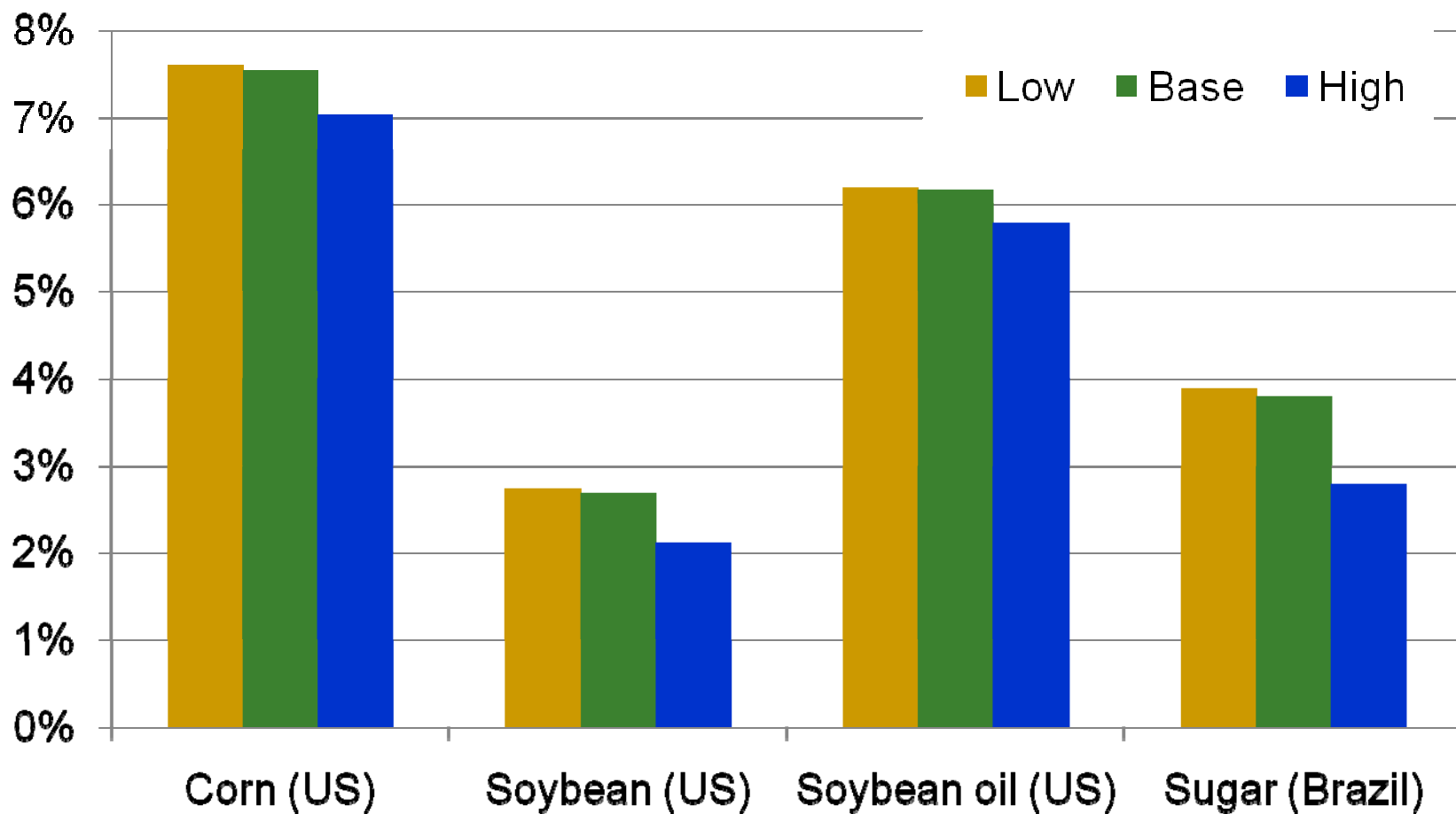
Petroleum from \$125 to \$160: Effects on Brazil land use

	Low		Base		High	
Other land classes	0.0	0.00%	-29.9	-0.03%	-54.9	-0.05%
Forest	0.0	0.00%	-77.1	-0.02%	-819.2	-0.18%
Agriculture	0.0	0.00%	106.9	0.04%	874.1	0.30%
Pasture	-87.6	-0.04%	-104.4	-0.05%	-846.2	-0.43%
Perennial Crops	-9.2	-0.12%	-15.5	-0.21%	-87.1	-1.16%
Sugar	10.5	0.18%	22.5	0.39%	122.5	2.12%
Annual Crops	86.2	0.11%	204.1	0.27%	1683.6	2.20%
Wheat	-10.7	-0.60%	-7.7	-0.43%	29.4	1.64%
Corn	121.8	0.83%	146.2	0.99%	447.9	3.04%
Soybeans	-34.9	-0.16%	-2.4	-0.01%	400.7	1.84%
Rice	-13.6	-0.46%	-8.7	-0.29%	52.7	1.76%

Petroleum from \$125 to \$90: Effects on Brazil land use

	Low		Base		High	
Other land classes	0.0	0.00%	32.8	0.03%	61.2	0.06%
Forest	0.0	0.00%	85.1	0.02%	916.9	0.20%
Agriculture	0.0	0.00%	-117.9	-0.04%	-978.1	-0.34%
Pasture	85.3	0.04%	92.4	0.05%	759.8	0.39%
Perennial Crops	10.2	0.14%	17.2	0.23%	99.5	1.32%
Sugar	-3.2	-0.06%	-8.5	-0.15%	-49.2	-0.85%
Annual Crops	-92.3	-0.12%	-218.9	-0.29%	-1787.7	-2.33%
Wheat	8.0	0.44%	4.8	0.27%	-34.5	-1.92%
Corn	-236.0	-1.61%	-261.0	-1.78%	-567.2	-3.86%
Soybeans	95.9	0.44%	61.4	0.28%	-365.1	-1.67%
Rice	8.5	0.29%	3.3	0.11%	-61.5	-2.05%

Petroleum from \$125 to \$160: Effects on market prices



What to conclude about indirect effects on land use?

Land allocation responsiveness critically important, but so are other assumptions.

- Ethanol market effects?
- Commodity market interactions?

Complicated interaction of ethanol market, commodity market, and land use effects.

- Larger price effects consistent with inelastic markets → small land use effects or small consumption effects.
 - Smaller price effects consistent with elastic markets → larger land use or consumption effects.
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For more information

- For more on the FAPRI-MU US stochastic baseline and biofuel policy analysis work, go to
 - <http://www.fapri.missouri.edu/>.
 - For FAPRI US and world baseline and analysis, go to
 - <http://www.fapri.missouri.edu/> or <http://www.fapri.iastate.edu>.
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