

# *Building International Markets for Biofuel*

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# Questions

*What kind of international market  
for biofuel do we need?*

*Have?*

*Likely to have?*

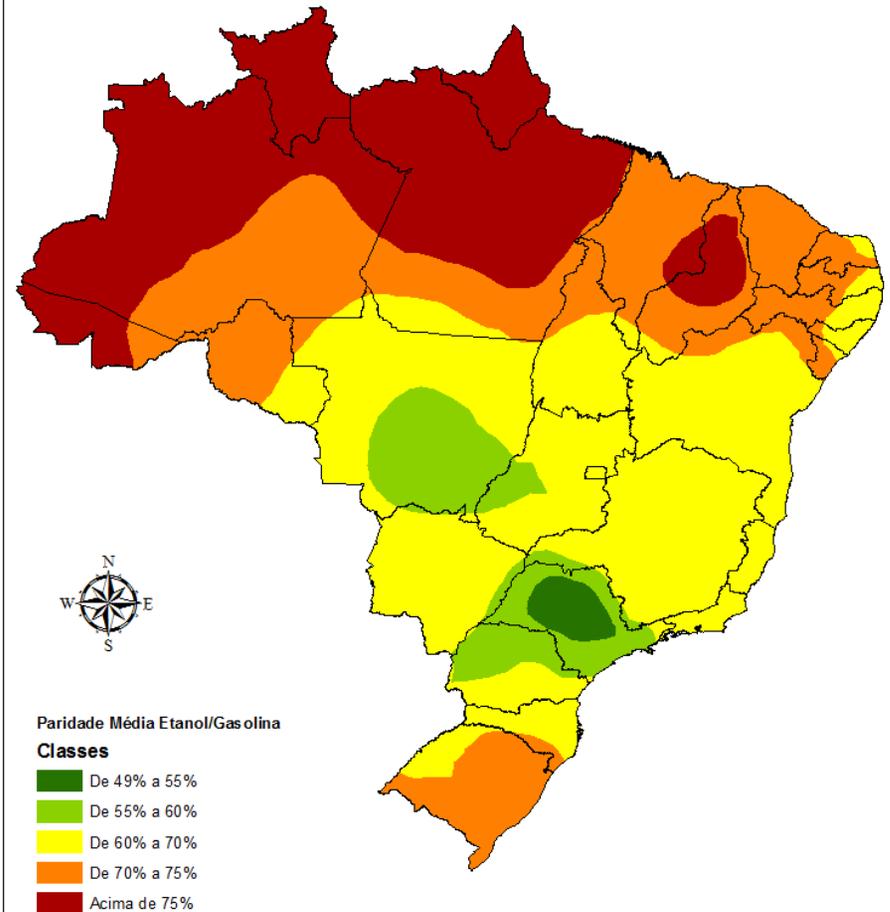
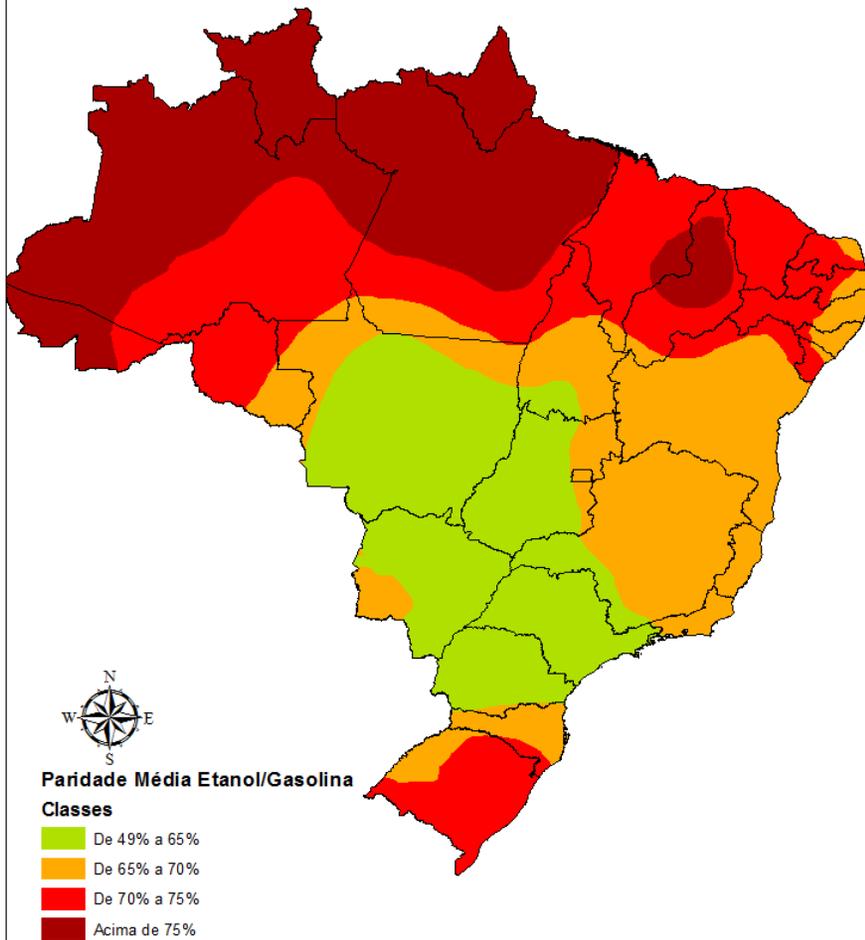
# Main points

- The international demand for biofuel is driven by environmental concerns (credence good).
- The majority of the biofuel traded in the international market nowadays is not “sustainable biofuel”
- The few “sustainable biofuel” that has been traded relies on bilateral and idiosyncratic contracts as governance structures
- The market institutions for transacting ‘sustainable biofuel’ are not yet in place. Moreover, they are not likely to emerge in the short-run
- Implications?

# Demand for (sustainable) biofuel

- Energy security and/or sustainability
- In average, biofuel is privately more expensive than fossil fuel
- Biofuel also requires changes in vehicle engines, and investment in infrastructure. If they do not provide lower environmental and social costs, they will not be adopted in large scale.
- Even in Brazil, where ethanol is competitive, there are regions where ethanol is consumed only by mandate.

# Iso-relative prices in Brazil



# Some explicit statements by major importers

## EU

- Netherlands, 2006, Cramer Committee, mandatory quotas should distinguish sustainable from other biofuels. (net reduction in GHG emissions, and a number of other environmental and social conditions)
- EU draft Directive and the UK RTFO (increasing environmental and social standards)

## In short

- The international market for biofuel demands goods with credence attributes related to sustainability.
- Trading mechanisms that credibly transmit information about sustainability are needed
- Each demander requires an ‘information set’ related to the environmental (and social) standards.

# Actual International Market of Biofuel

- How relevant is international trade of biofuel?
  - IEA: increasing relevance, about 20% of domestic production
  - Probably overestimated

## Increasing relevance?

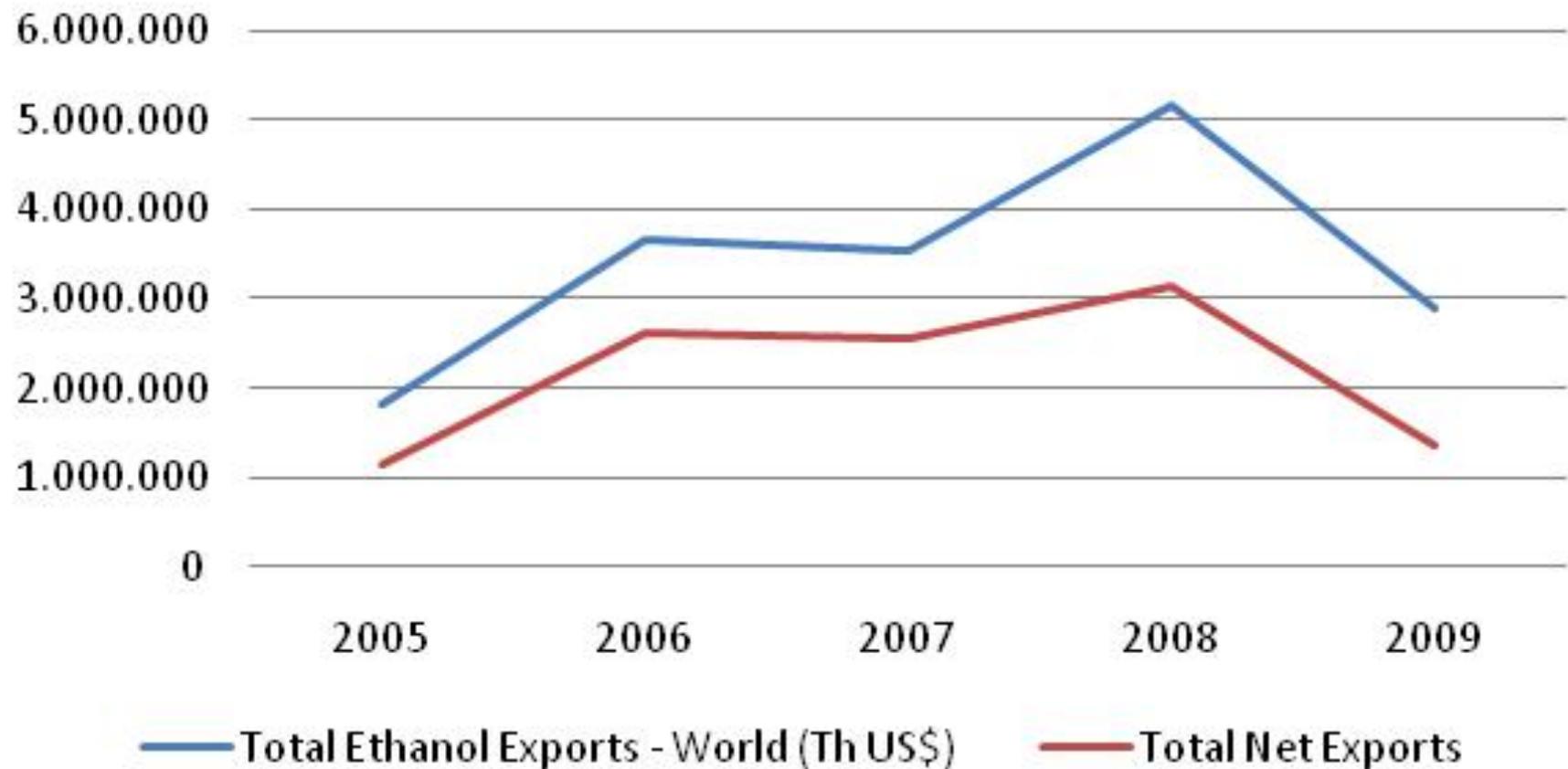
- Ethanol production has been increasing at a annual rate of 19% during the last eight years. It still accounts for about 2% of road transport (there is still leeway for continues growth).
- Ethanol trade has also been increasing, but at a lower rate, and not monotonically.

# Relevance of International Trade

## 20% of domestic production?

- If we take into account only net exports, trade represents 10% of domestic production. And if we aggregate regional markets (e.g. EU), figures are even lower.
- As a consequence, ethanol is still mainly a domestic commodity.

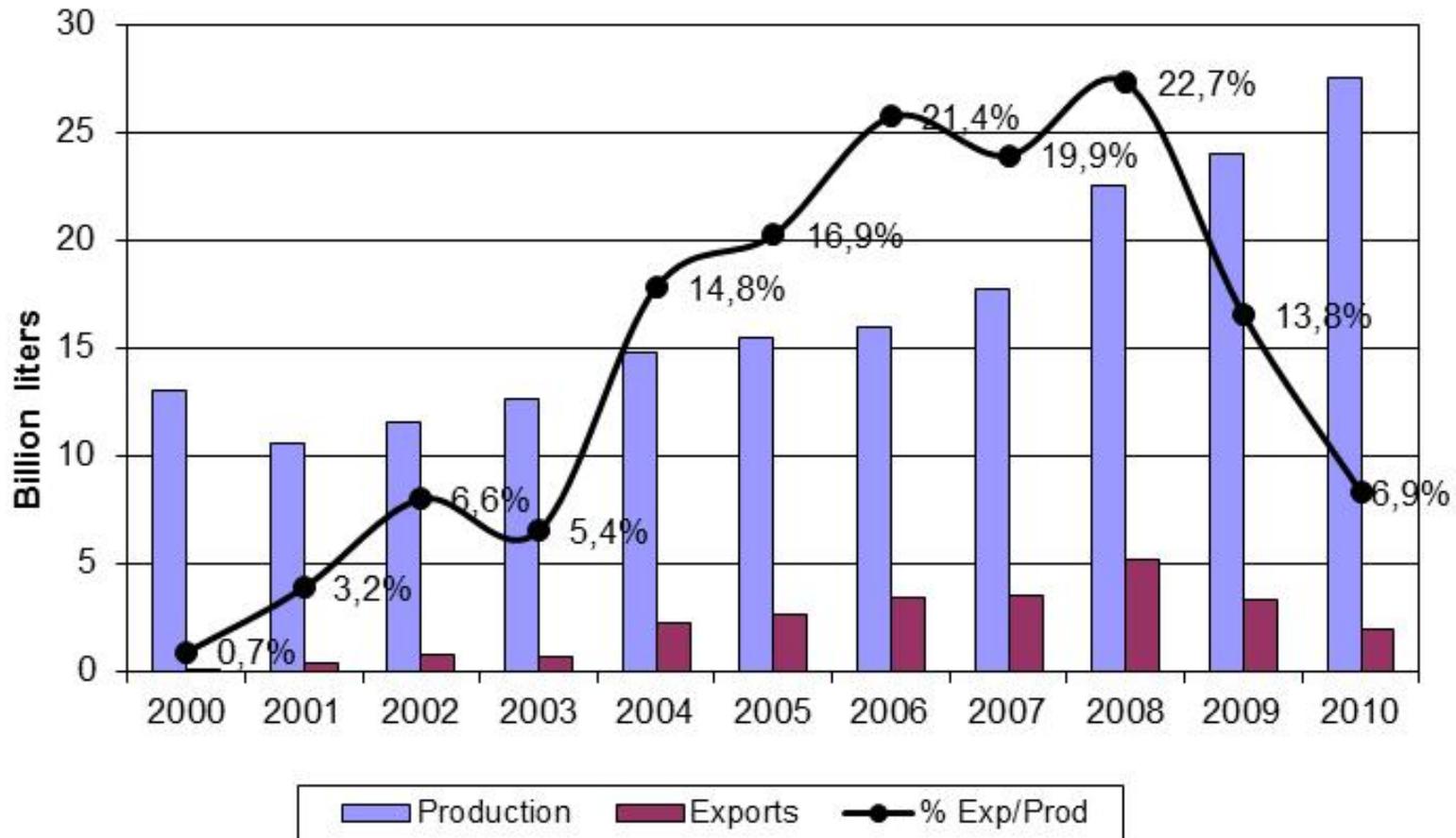
## International Trade - Ethanol



## **This is also clear in a country level analysis**

- The U.S. and Brazil accounts for about 80% of total production, but are also the major consumers.
- U.S., an important importer, but became a net exporter in 2010. Imports reached its peak at 5% of domestic consumption and now net exports represents only 1.2% of domestic production.
- In Brazil, exports reached a peak of 23%, but it is now limited to about 10%.
- Ethanol is a promising world commodity, but the international market is far from developed

# Relevance of ethanol exports



# What kind of ethanol has been traded?

- There is huge variability regarding the sustainability features of bioethanol
  - Crop (e.g. sugar-cane),
  - Technology employed (e.g. 1<sup>st</sup> or 2<sup>nd</sup> generation ethanol),
  - Agricultural techniques,
  - Cropping and harvesting methods,
  - Employment relations etc.
- The region where it is produced doesn't inform several features of the production process and external effects.

# Qualitative evidence from Brazilian exports

- Some demanders from Japan and the EU require a more comprehensive information set related to sustainability attributes.
- Information about credence attributes is transmitted by means of bilateral and idiosyncratic contracts
  - Duration, Safeguards, Pricing rules, and ‘Information set’ that express sustainability
- In contrast, exports to U.S./Caribbean derive from short term relative prices opportunities

# Quantitative Evidence

- Monthly data about Brazilian exports for each destination
- Hypothesis
  - US/Caribbean: spot or short term forward market
  - EU/Japan: forward market and long term contracts
- Expected regularities:
  - EU/Japan: lower variance (quantity), stable seasonality, and non persistent shocks
  - US/Caribbean: higher variance, moving seasonality, price shocks persistent for the period of arbitrage

## Main results

- **Variance** of quantity and price

US: 1.16 and 0.26

Caribbean: 0.92 and 0.22

EU: 0.67 and 0.20

Japan: 0.58 and 0.22

Differences in the variance of quantity between the two groups are significant and consistent with the differences in governance structures

# Seasonality

- US and Caribbean:
  - No evidence of stable seasonality on quantities and on prices;
  - Seasonal monthly index consistent with arbitrage between prices in the U.S. and Brazil
  - Consistent with the proposition of exports driven by price opportunities year by year
- Japan and EU:
  - Evidence of stable seasonality.
  - Seasonal monthly index consistent with Brazilian production
  - Consistent with long term contracts

# Price Volatility

- U.S. and Caribbean
  - Persistence consistent with arbitrage in the forward market
- EU and Japan
  - No evidence of persistence (consistent with the idea that the price shock does not induce further adjustments)
- Japan: magnitude of shocks are not significant

## Summing up

- We have evidence that the majority of the ethanol traded is not ‘sustainable ethanol’
- Sustainable ethanol is traded by means of long term contracts
- Trading mechanisms that transmit information about biofuel socio-environmental sustainability are not yet in place
- Are they likely to emerge?

# Constraints for the emergence of market institutions for sustainable biofuels

- Dozens of certifications associated to different ‘information sets’
- Coordination problem aggravated because of network externalities and the lack of authority
- Standards may conflict with WTO norms
- Multilateral public policy may change this scenario

## Some implications

- Eliminating trade barriers is not a sufficient condition to enhance trade (of sustainable biofuels)
- Multi-market models should take into account important frictions in the international market
- Information is likely to be an important constraint to the development of bioenergy as an alternative to fossil fuels