Modelling the effects of an abolition of the EU sugar quota on internal prices, production and imports

114th Seminar of the EAAE
‘Structural Change in Agriculture’
Berlin, 15 – 16 April 2010
Stephan Nolte
Introduction

• EU-CMO Sugar Reform in 2006
  ▶ Production quotas reduced in restructuring from 17.4 to 13.3 million tons
  ▶ Internal price reduced from > 700 € to < 500 € per ton
  ▶ No directly subsidized exports anymore, cross-subsidized exports within WTO limit
  ▶ Preferential access to various country groups increased from 2 to ~3-5 million tons
Introduction

- Current CMO sugar expires after 2014/15
- Abolishment of Quotas possible as of 2015/16
  - As on the dairy market, will lead to increased production in some member states
    - Lower internal market price
      - Lower production in other member states (possibly liquidation of sugar sectors)
    - Discouragement of preferential imports
Research Questions

• Which member states will increase, which will decrease or cease sugar production?
• What will the internal price be?
• How are preferential imports affected?
• What is the effect on the world market price?
• Will the EU become an exporter again?
Outline

1. Introduction
2. Model
3. Scenarios
4. Results
5. Conclusions
Model

- Global Sugar Model with 106 countries
- Quotas, *ad valorem* and specific tariffs, TRQ, direct payments, export subsidies
- Supply Functions of EU member states allow abandoning production at positive price
- Remainder of supply and demand functions is isoelastic
Model

- Calibrated Spatial Price Equilibrium (SPE) Model
- Spatial Model necessary to simulate preferential trade relationships
- Original SPE (Enke, Samuelson, Takayama and Judge) behaves like an optimisation model
- Not able to reproduce observed matrices of trade
- Linear programming formulation restricts the possible number of trade flows
LP transport model

Importers

Exporters

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LP transport model

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Observed trade

Importers

Exporters

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Calibrated SPE

- Original price transmission equation:
  \[ P_{\text{exporter}} + \text{freight} + \text{tariffs} \geq P_{\text{importer}} \]
  \[ \downarrow \text{trade}_{\text{exp} \cdot \text{imp}} \]

- Calibrated price transmission equation:
  \[ P_{\text{exporter}} + fr + tar + d + q^* \text{trade}_{\text{exp} \cdot \text{imp}} \geq P_{\text{importer}} \]
  \[ \downarrow \text{trade}_{\text{exp} \cdot \text{imp}} \]
Estimation of the Model

• Trade data, which is very poor, is made consistent with sugar balances of model regions

• Analogue to the three steps of PMP:

  1. Original SPE Model is solved with observed trade flows, prices and quantities fixed
Estimation of the Model

2. Shadow prices of the trade flow constraints are added to observed transport costs and trade policy parameters

3. Model is solved with calibrated cost terms and replicates observed trade matrix
Estimation of the Model

- Parameters of the quadratic cost terms \((d & q)\)
  - First order derivative will have a large influence on the simulation behaviour of the calibrated model
- Hypothesis: Costs increase with increasing trade
  - \(q\) must be positive
- Economic Explanations:
  - Exporters minimize risk by spreading their exports
  - Exporters are willing to pay a premium to be present in a market
Estimation of the Model

• OLS regression of shadow costs from step 2 as a function of the share of exports on this route in total production of the exporter

\[
\text{shadow costs}_{j,i} = \beta_0 + \beta_1 \times \text{prod}_\text{shr}_i + \varepsilon_{j,i}
\]

• \(\beta_1: 0.614; \ r^2: 0.024; \ F\text{-test}: <0.0001\)
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Scenarios (2015/16)

• **Reference Scenario:**
  - Quota system continued
  - World market price develops as forecasted by FAPRI (2009)

• **Alternative Scenarios:**
  - Abolition of quota
  - Different developments of world market price 1 standard deviation below/above FAPRI projections
Outline

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### Results

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Source: Own Simulations. In real 2004/05 €/ million tons WSE
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Source: Own Simulations. 1000 tons WSE
### Results

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<th>Region</th>
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Outline

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Conclusions

• Abolition of the quota system leads to increased production in the centre of the EU
• The domestic price of the EU decreases
• World market price almost unaffected
• Lower production in countries at the southern and northern boundaries
• Preferential imports decrease, as well
Conclusions

- All simulated effects increase in size, the higher the world market price
- World market price has an influence on the community price via preferential imports
- Transmission of world market price fluctuations are dampened if quota system is abolished
- Quota abolition has no significant impact on the world market price
Conclusions

• Approach of Calibrated SPE has proven the ability to reproduce observed base data and to simulate realistic results

• Goes beyond previous approaches of calibration (Paris et al., 2009) and alternative models to the SPE
  ▶ Nonlinear cost terms
  ▶ Economic Explanation/Econometric specification