STRUCTURAL CHANGE IN EUROPEAN CALF MARKETS: POLICY DECOUPLING AND MOVEMENT RESTRICTIONS

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Centre for Statistics

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Motivation

- Reforms of the Common Agricultural Policy (CAP)
  - 2003: Fundamental Fischler Reforms
  - Discretion over timing and degree of decoupling for member states
- EU beef sector
- Occurrence of Blue Tongue disease (BT) (animal movement restrictions)

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Outline

1. Background
2. Data and Model Selection
3. Results and Discussion
Fischler reforms

Before  Direct payments per animal (coupled)
- Special premium for male bovine animals
- Slaughter premia for adult animals and calves
- Suckler cow premia
- National premia

After  Decoupling from production
- Single farm payment (SFP)
- National decision on date and degree

Effect  Price decrease
- Calves input for cattle fattening
- Reduction of marginal value product & factor demand for calves
- Different national outcomes
  ⇒ trade flows?

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Ihle, Brümmer, Thompson
Structural Change in Calf Markets
Reform implementation

Policy variable:

\[ pol_z^t = 100 \left( 1 - \frac{\text{premia paid by } Z \text{ in } t}{\text{average premia paid by } Z \text{ in base period}} \right) \]

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Table: Degree of Decoupling in %

Ihle, Brümmer, Thompson Structural Change in Calf Markets
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Blue Tongue

Origin  Sub-Saharan Africa/ Mediterranean region
Charact. seasonal non-contagious viral disease of ruminants ⇒ serotypes
Outbreak With global warming northwards
  - August 2006: Southwest Netherlands
  - Autumn 2006: Neighbours
  - August 2007: Massive outbreak ⇒ structural break?
  - February 2008: Northeast Spain
Effects Reduced fertility and milk yields
In 2007, due to the spread of the disease, the exposed population rose to at least 1,317,111 cattle, 503,282 sheep, and 3,346 goats on affected farms. The numbers of infected animals on these farms amounted to 26,772 cattle, 32,116 sheep, and 209 goats in 20,624 new outbreaks. While mortality rates remained relatively low, as in 2006, the case-fatality proportion rose to 13.1% in cattle and 41.5% in sheep.

In 2008, BT incidence decreased considerably under the influence of a mass vaccination campaign that started in May and June 2008 (Figure 2), before the 2008 vector season. In 2008, a total of 1,070 new cases (PCR-positive, sampled after May 1, 2008; i.e., infection was acquired during the current transmission season) were reported. They were found mainly in 2 regions in northwestern Lower Saxony and western Baden-Württemberg (Figure 1, panel C), where the vaccination campaign started relatively late because of an initially limited supply of BTV-8-vaccine.

Conclusions

The number of BTV-8 infections in Germany that peaked during the summer and autumn of 2007 showed that even a limited BTV-8 outbreak can dramatically spread within a few months after detection of the first cases. After the initial incursion and limited spread in 2006, BTV-8 overwintered, resulting in efficient spread of BTV-8 during 2007 and severe consequences for cattle and sheep farmers. The case-fatality rate was ≈3× higher for sheep than for cattle (37.5% vs. 6.4% in 2006 and 41.5% vs. 13.1% in 2007). These findings illustrate that BTV-8 was more pathogenic for sheep than for cattle. It must be stressed, however, that the virus caused clinical disease and death in cattle, although other serotypes cause clinical disease and deaths primarily in sheep.

As a result of the vaccination campaign, the number of new cases reported in 2008 (through August 2008) was substantially lower than in 2007, demonstrating that conva...
Spatial Price Dynamics

- Law of One Price: \( p^Y_t - p^X_t = \tau^XY_t \)
- Short-run deviations from equilibrium condition
- Cointegration analysis

\[
\Delta p_t = \alpha \beta' p_{t-1} + \sum_{i=1}^{k} \Gamma_i \Delta p_{t-i} + \epsilon_t
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- Market integration: flow of commodities and information
  - Trade flows
  - \( n - 1 \) cointegration relationships for \( n \) markets
- Price transmission: long- vs. short-run
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Structural Change in Calf Markets
Dataset

- Post-2003 CAP reform data
- Country selection:
  - Germany (DE): large net exporter
  - France (FR): largest exporter and fourth largest importer
  - Netherlands (NL): largest importer
  - Spain (ES): second largest importer
- Weekly prices of young male calves (1-4 weeks)
- Range: May 15, 2003 - April 30, 2009 (310 observations)
- Policy variable
- Potential impact of BT
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Price Data

Figure: Weekly Calf Prices

- August 2006: First BT outbreak in Northern Europe
- August 2007: Massive BT infection in Northern Europe
Model Specification

- Lags: $k = 2$ (AIC)
- Dummy variable for the year 2003
- Seasonality: 52 weekly dummies (likelihood-ratio test)
- Forward backward range unit root test (FB-RUR) (Aparicio et al., 2006)
- Inclusion of policy variables into cointegration relations
- Test for structural break in cointegration space (Gregory and Hansen, 1996)
  - ADF* statistic: -5.29 vs. 95% critical value: -5.28
  - Observation 224 (2007/35) → $d_{Aug07}$

Final model:

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\Delta p_t = \alpha \beta' \left( p_{t-1} \right. \left. \text{const trend pol}_DE \text{ pol}_FR \text{ pol}_NL \ d_{Aug07} \right)' + \sum_{i=1}^{2} \Gamma_i \Delta p_{t-i} + \text{seasonal dummies} + \epsilon_t
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Unit Roots and Cointegration

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<td>1.947</td>
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<td>2.839</td>
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Critical values 5%: 1.866, 1%: 1.582

- Saikkonen-Lütkepohl cointegration test: 3 (\(= n - 1\)) cointegration relationships
- Over-identifying restrictions
  - Strong form of the LOP for ES-NL and FR-NL
  - German decoupling \(\not\rightarrow\) ES-NL or FR-NL
  - French/Spanish policy \(\not\rightarrow\) DE-NL
  - BT outbreak 2007 \(\not\rightarrow\) DE-NL
  - Adjustment and short-run parameters (252): sequential elimination (Hannan-Quinn) \(\Rightarrow\) 28 exclusion restrictions
- Outliers: 11 (\(|\hat{\epsilon}_t| > 3.3\hat{\sigma}_t\) as in Hendry and Juselius (2001))
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Dynamic Analysis

Cointegration relationships

- DE–NL
- FR–NL
- ES–NL

Figure: Persistence Profiles of the Restricted Model
Counterfactual Simulations

- Illustrate the effect of decoupling on the equilibrium prices
- Equilibrium prices of observed policy vs. hypothetical scenarios
- Multivariate system
- Choices of country’s own policy and of other countries

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<td>Observed price (€/head)</td>
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<td>246</td>
<td>196</td>
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<tr>
<th>Actual policy</th>
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<td>Equilibrium price (A)</td>
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<td>Ratio (A) to (B)</td>
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Table: Scenario 1 - Fully Coupled Policies on January 1, 2005
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| Actual policy | Policy variable | 100 | 7.5 | 7.5 | 1.6 |
| Equivalent price (A) | 151 | 156 | 198 | - |

| Scenario I | Policy variable | 0 | 0 | 0 | 0 |
| Equivalent price (B) | 163 | 162 | 254 | - |

| Ratio (A) to (B) | 0.92 | 0.96 | 0.78 | - |

Table: Scenario I - Fully Coupled Policies on January 1, 2005
Markets are integrated
Long-run price transmission almost perfect
Short-run price transmission very fast (5 to 11 weeks)
Fast absorption of system-wide shocks (4 weeks)
Prices tightly interrelated in space

Structural changes:
- Decoupling: significant depressing effect on prices
- Own-policy vs. cross-policy effect
- Costs vs. benefits of member state specific policy reforms in an internal market
- BT: significant impact on long-run price transmission
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