Structural Change in European Calf Markets: Policy Decoupling and Movement Restrictions

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Motivation

GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN

- 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)

Interest:
Impact of structural changes on long-run price transmission in EU calf markets

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Outline

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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
  $\Rightarrow$ trade flows?

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Reform implementation

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Policy variable:

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

Year	2005	2006	2007	2008	2009
pol_{DE}	100	100	100	100	100
pol_{FR}	7	77	78	78	77
pol_{NL}	2	24	24	24	25

Table: Degree of Decoupling in %

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Blue Tongue

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Origin Sub-Saharan Africa/ Mediterranean region

Charact. seasonal non-contagious viral disease of ruminants $\Rightarrow$ serotypes

Outbreak With global warming northwards

- August 2006: Southwest Netherlands
- Autumn 2006: Neighbours
- August 2007: Massive outbreak
  $\Rightarrow$ structural break?
- February 2008: Northeast Spain

Effects Reduced fertility and milk yields

Blue Tongue

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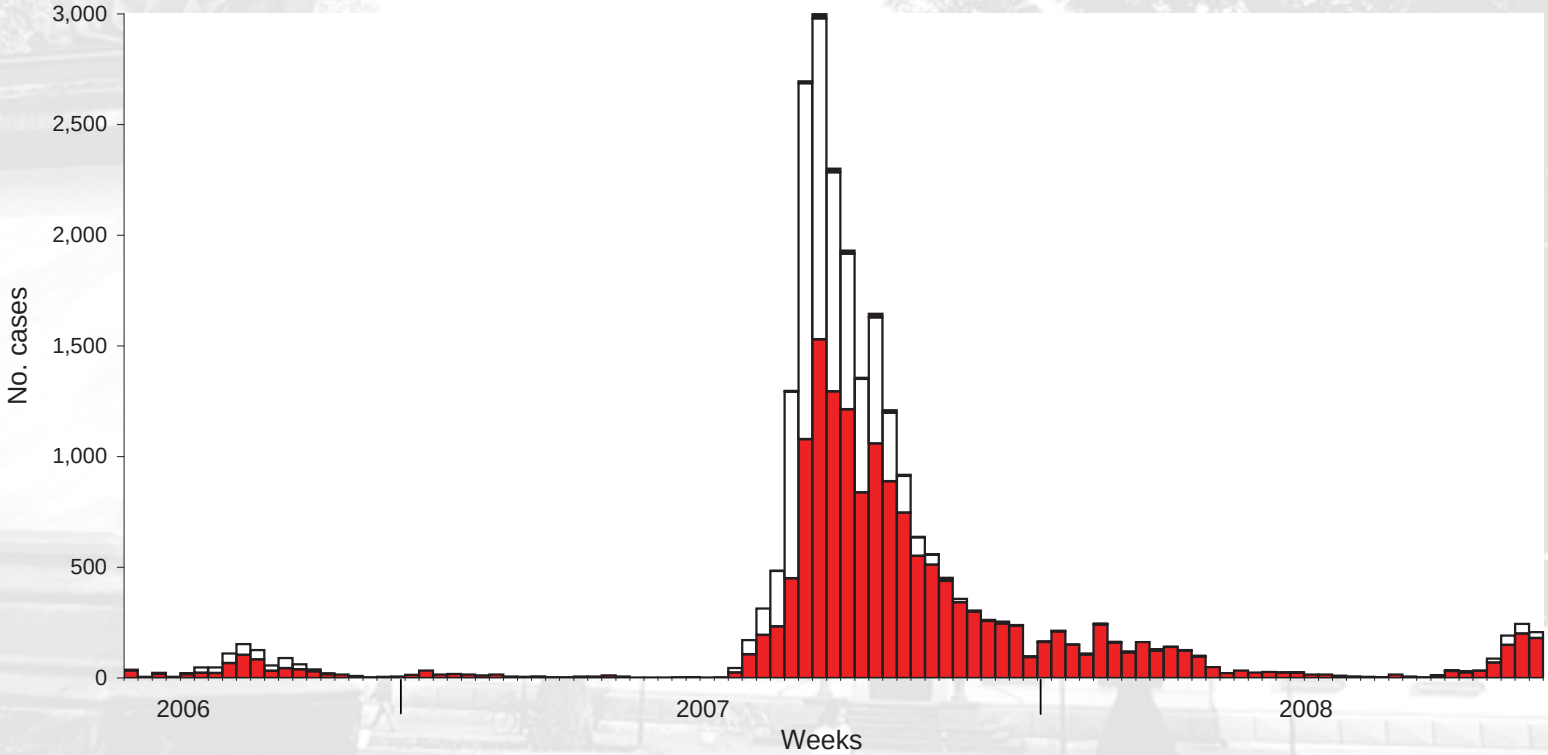

Figure: BT Outbreaks in Germany (Conraths et al., 2009)

Spatial Price Dynamics

- Law of One Price: $p_t^Y - p_t^X = \tau_t^{XY}$
- Short-run deviations from equilibrium condition
- Cointegration analysis

$$\Delta p_t = \underbrace{\underbrace{\alpha}_{\text{Loading matrix (Adjustment speeds)}} \underbrace{\beta' p_{t-1}}_{\text{Cointegrating relations (Equilibrium errors)}}}_{\text{Error-correction}} + \underbrace{\sum_{i=1}^{k} \Gamma_i \Delta p_{t-i}}_{\text{Past price movement (Short-run dynamics)}} + \epsilon_t$$

- 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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Dataset

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- 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

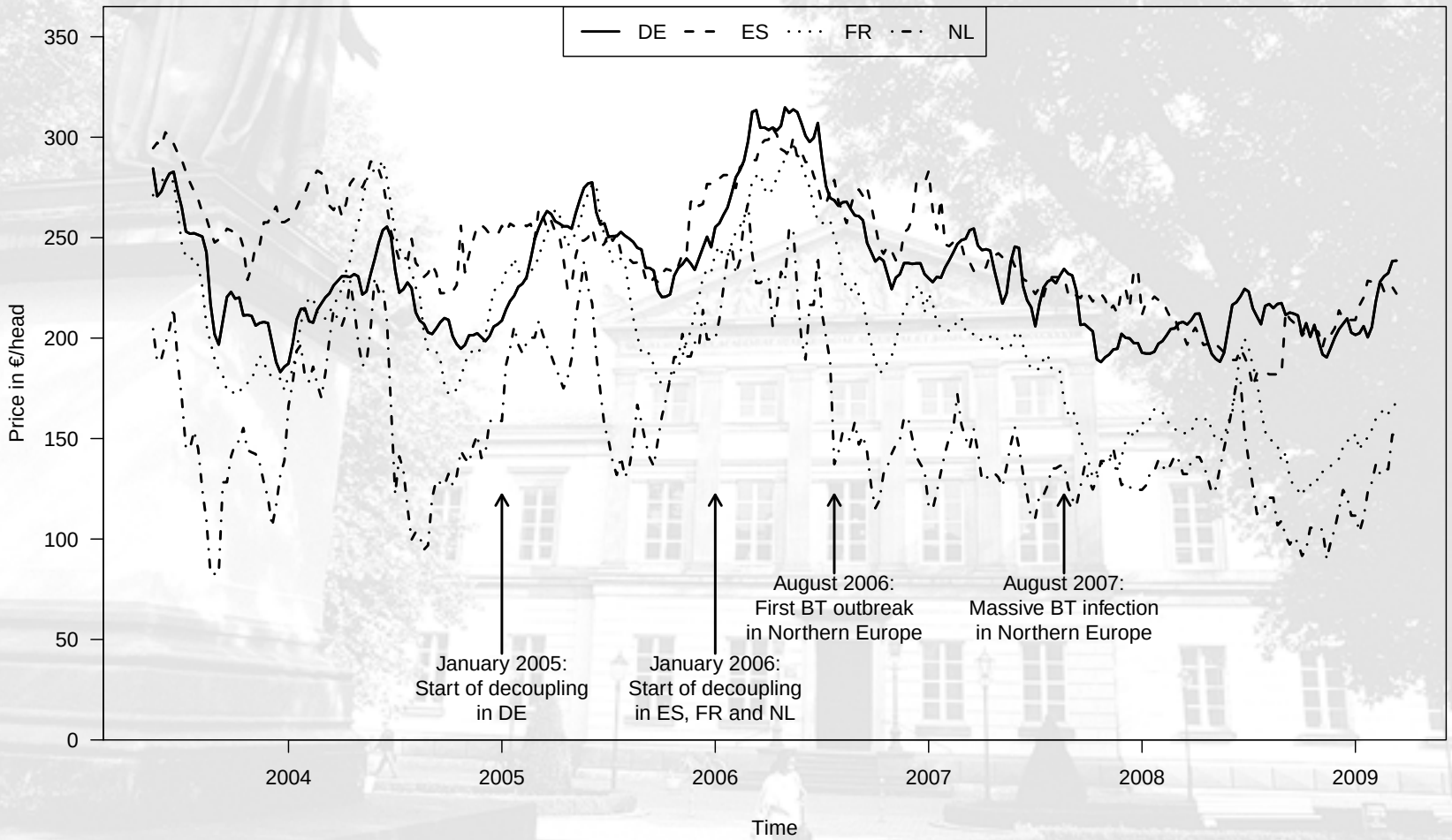

Figure: Weekly Calf Prices

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) $\Rightarrow$ d_{Aug07}

Final model:

$$\Delta p_t = \alpha\beta' \left(p'_{t-1} \; const \; trend \; pol_{DE} \; pol_{FR} \; pol_{NL} \; d_{Aug07}\right)' + \sum_{i=1}^{2} \Gamma_i \Delta p_{t-i} + \text{seasonal dummies} + \epsilon_t$$

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Unit Roots and Cointegration

Series	DE	ES	FR	NL
FB-RUR statistic	1.947	2.433	2.839	1.379***

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 ($|\hat{\epsilon}_t| > 3.3\hat{\sigma}_{\hat{\epsilon}_t}$ as in Hendry and Juselius (2001))

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Estimation

	NL	Const	Trend	pol_{DE}	pol_{FR}	pol_{NL}	d_{Aug07}
DE	1.173***	-.932***	.002***	-.0007**	0	-.006**	0
ES	1.000	.349***	.002***	-.0022***	-.009**	.023*	-.135***
FR	1.000	.116	>-0.001	0	-.013***	.039***	.014

Table: Cointegration Relationships of the Restricted VECM

Coint. rel.	DE-NL		ES-NL		FR-NL	
DE	-.077***	[8.7]	0		.062***	[10.8]
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Dynamic Analysis

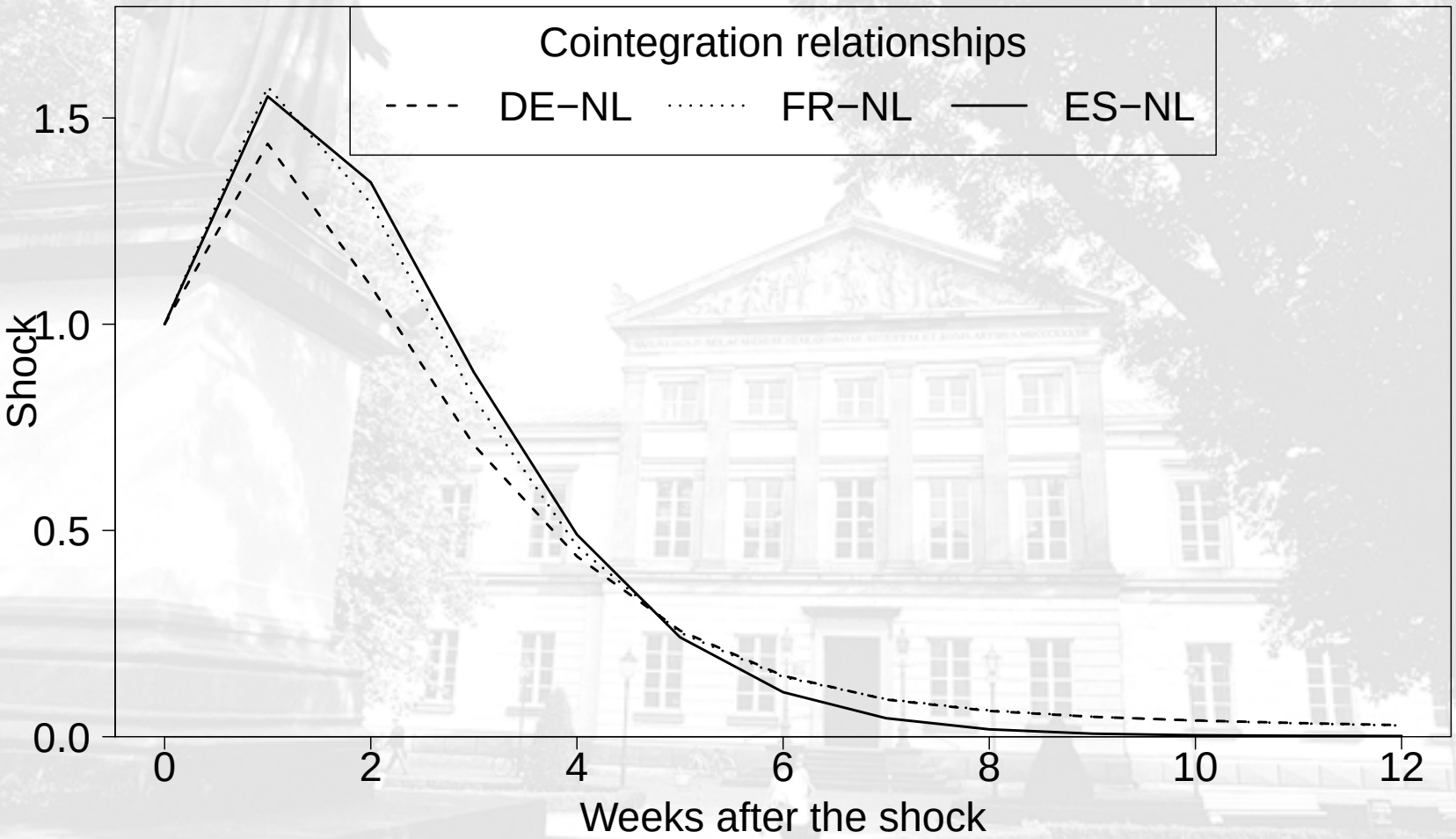

Figure: Persistence Profiles of the Restricted Model

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

	Country	DE	ES	FR	NL
	Observed price (€/head)	200	246	196	145
Actual policy	Policy variable	100	7.5	7.5	1.6
	Equilibrium price (A)	151	156	198	-
Scenario I	Policy variable	0	0	0	0
	Equilibrium price (B)	163	162	254	-
	Ratio (A) to (B)	0.92	0.96	0.78	-

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- 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
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