

# CAP effects on labour use in agriculture

Evidence from alternative dynamic panel data models

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## 'Putting rural development to work for jobs and growth'

### 1. Introduction

On 2 February 2005, the European Commission relaunched the **Lisbon strategy** for the European Union (EU). The strategy seeks to tackle the EU's urgent need for higher economic growth and job creation and greater competitiveness in world markets. It is a major EU policy priority. The Lisbon strategy aims to provide people with a better standard of living in an environmentally and socially sustainable way.

The Lisbon strategy: key elements of the Commission's relaunch

### 2. Agriculture — the heartbeat of rural areas

The agricultural and rural constituency is important. Rural areas (1) cover 90 % of the EU's territory and are home to approximately 50 % of its population. Agriculture and forestry are the main land users and play a key role in the management of natural resources in rural areas and in determining the rural landscape. Agriculture makes a valuable contribution to the socioeconomic development of

# Overview

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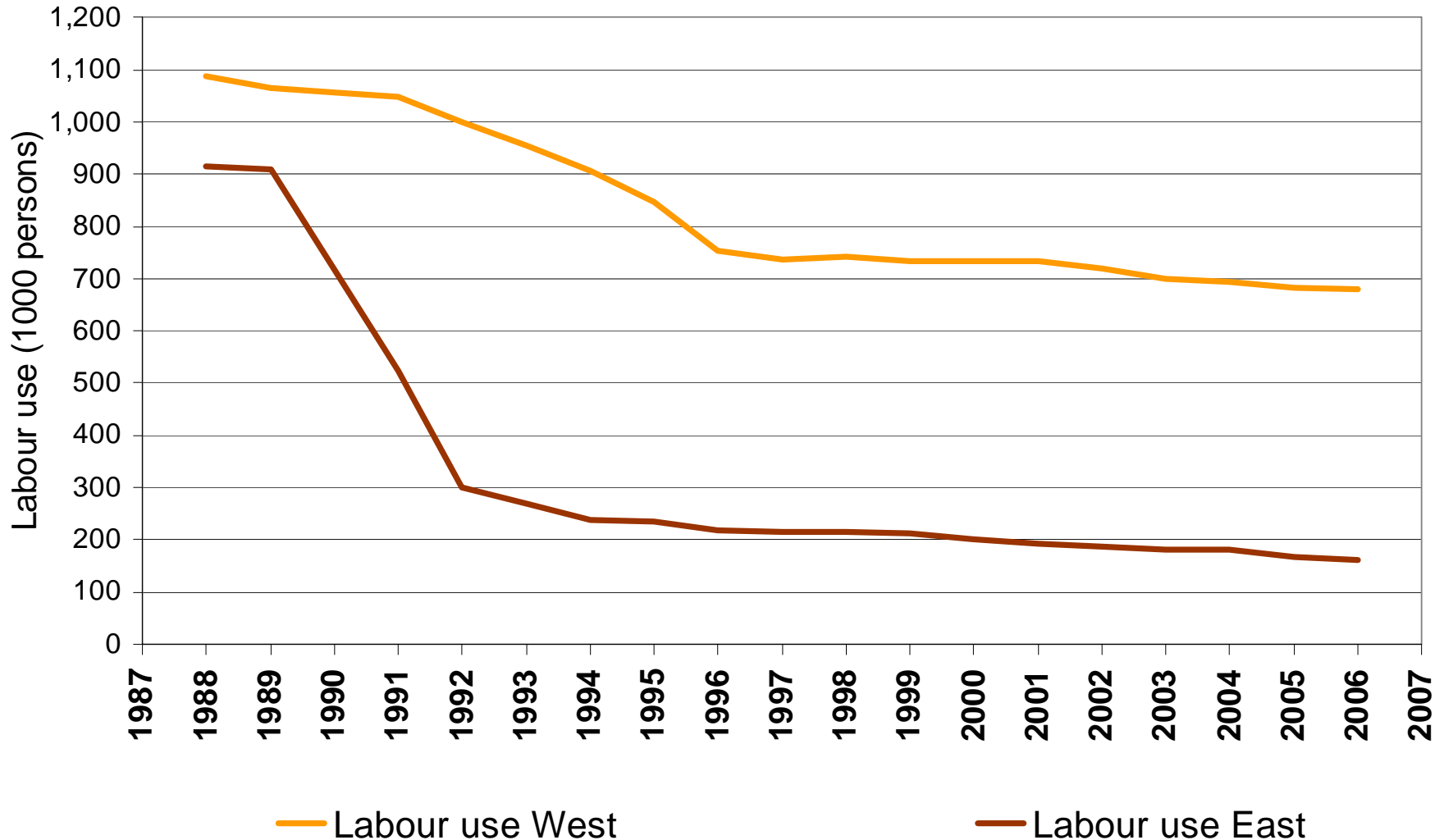
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# Background & objectives

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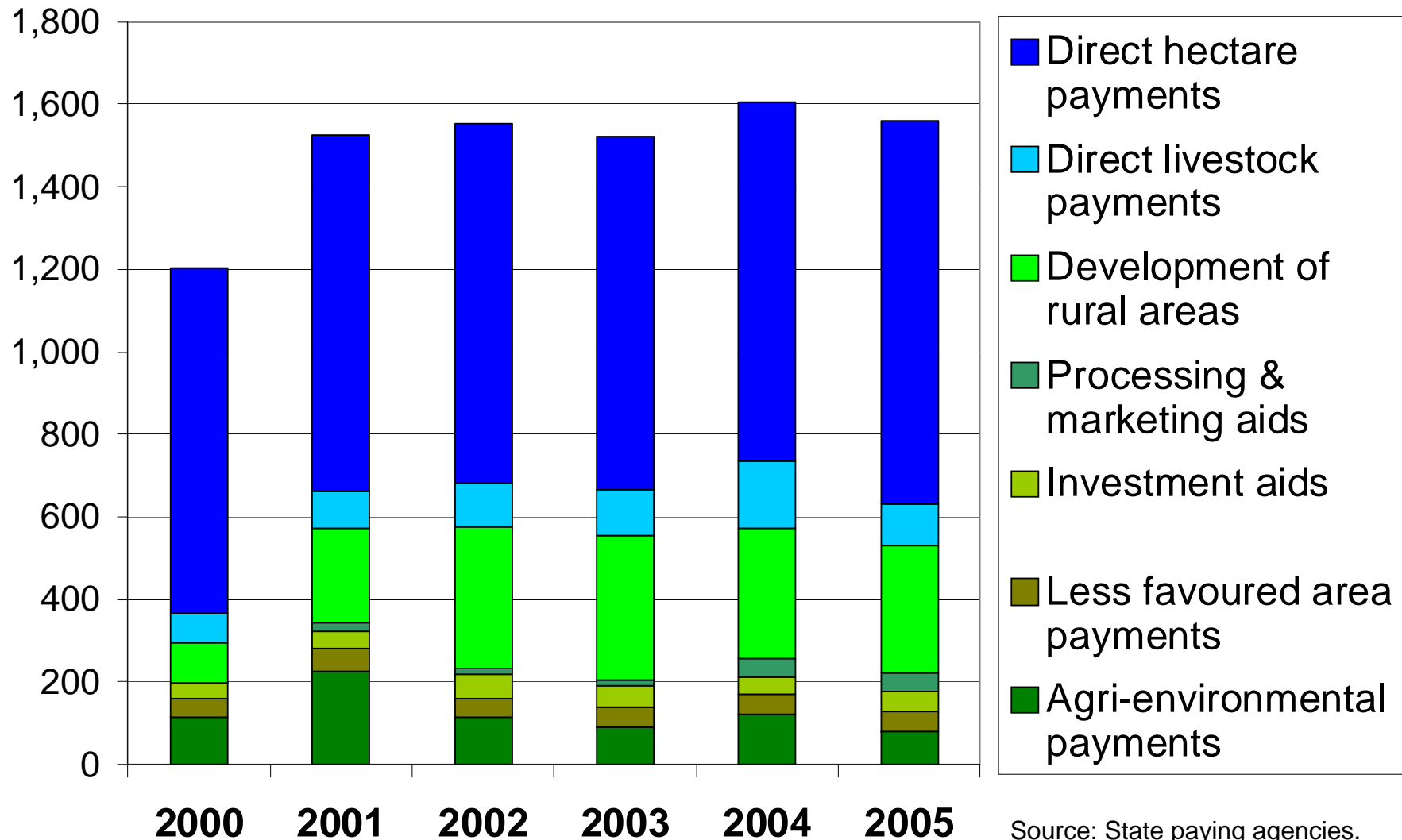
- Literature on dynamic factor adjustment, following duality framework by Epstein & Denny 1983.
- Mostly focused on capital, rarely used for direct evaluation of policies
- **Our objective:** estimate a dynamic labour equation augmented by full set of CAP measures at regional level
  - Simultaneous analysis of entire CAP portfolio
  - Methodological focus on endogeneity issues
  - Unit of observation is German Landkreise / NUTS-3

# Agricultural labour use in Germany 1988-2006



Source: Petrick & Zier 2010, based on official statistics.

# CAP expenses in Brandenburg, Saxony, Saxony-Anhalt (million euro)



Source: State paying agencies.

# The dynamic labour adjustment model

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The (primal) optimisation problem:

$$\max_{L_t} PV = \int_0^{\infty} \{pf(L_t) - wL_t - C(\dot{L}_t)\} e^{-rt} dt$$

subject to  $L_0$  given, with  $PV$  present value of earnings,  $L_t$  labour use at time  $t$ ,  $pf$  value of output,  $w$  wage,  $C$  convex adjustment costs,  $r$  discount rate.

Solution by calculus of variations motivates a **partial adjustment model**:

$$L_t - L_{t-1} = \gamma(L_t^* - L_{t-1})$$

with  $L^*$  steady-state labour use,  $\gamma$  adjustment coefficient.

## Expected CAP effects on labour use in agriculture

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Direct payments	0
Development of rural areas	+
Processing & marketing	+
Capital subsidies	– (if substitutes)
Less favoured area payments	0
Agri-environmental payments	+
Decoupling	–

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# The estimating equation

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$$L_{jt} = \lambda L_{jt-1} + \beta_1 \theta_{jt} + \beta_2 p_{jt} + \beta_3 \tilde{Z}_{jt} + \beta_4 \bar{Z}_j + \varepsilon_{jt}$$

with  $\theta$  a vector of CAP measures,  $\tilde{Z}$  a vector of time-varying &  $\bar{Z}$  a vector of time-invariant regional characteristics,  $\lambda, \beta$  parameters,  $\varepsilon$  an iid error term.

Core **econometric challenges** of this model:

- Endogeneity of lagged dependent variable
- Endogeneity of policy variables

# Empirical strategy

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- Eliminating additively separable bias by fixed effects, also eliminates time-invariant rhs variables
- Instrumenting endogenous variables by lagged values of levels & first differences (dynamic panel data models)
- Time-varying price- & macro-effects captured by year dummies

# Overview of dynamic panel data models

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Approach	Fixed effects	Instruments	Estimation by
<i>Least squares dummy variable (LSDV)</i>	Dummy for each unit	-	OLS
<i>Arellano Bond (1991)</i>	First differences	Lags	GMM
<i>Blundell Bond (1998)</i>	First differences	Lags & differences	GMM
<i>Corrected LSDV (Kiviet 1995; Bruno 2005)</i>			Use GMM results to correct LSDV

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# Database for estimation

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- 69 Landkreise (counties) from 3 Länder (states) (16 Brandenburg, 24 Saxony-Anhalt, 29 Saxony)
- Dep variable: 11-13 years (1994-2006) unbalanced
- Rhs variables: 7 years (1999-2006) unbalanced

# Results

	LSDV	Arellano-Bond	Blundell-Bond	Corrected LSDV
Ag employment lagged	<b>0.64</b>	<b>0.45</b>	<b>0.81</b>	<b>0.76</b>
Direct hectare paym	0	0	0	0
Direct livestock paym	0	0	0	0
Dev. of rural areas	0	0	0	0
Processing & marketing	-	0	0	0
Investment aids	+	0	+	0
Less favoured areas	0	0	0	0
Agri-environment	0	0	0	0
Decoupling (2005/6=1)	0	-	-	-
N	483	414	483	483

Signs of significant parameters in blue, value only given for lagged employment.

Regression also contains population density, annual wage all sectors, and five year dummies.

# Av. short- and long-run losses due to decoupling

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	<b>Arellano- Bond</b>	<b>Blundell- Bond</b>	<b>Corrected LSDV</b>
<b><i>Short-run</i></b>	-8	-6	-4
<b><i>Long-run</i></b>	-15	-34	-16

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Percent of ag employees.

Mean employment per region = 1893 persons.

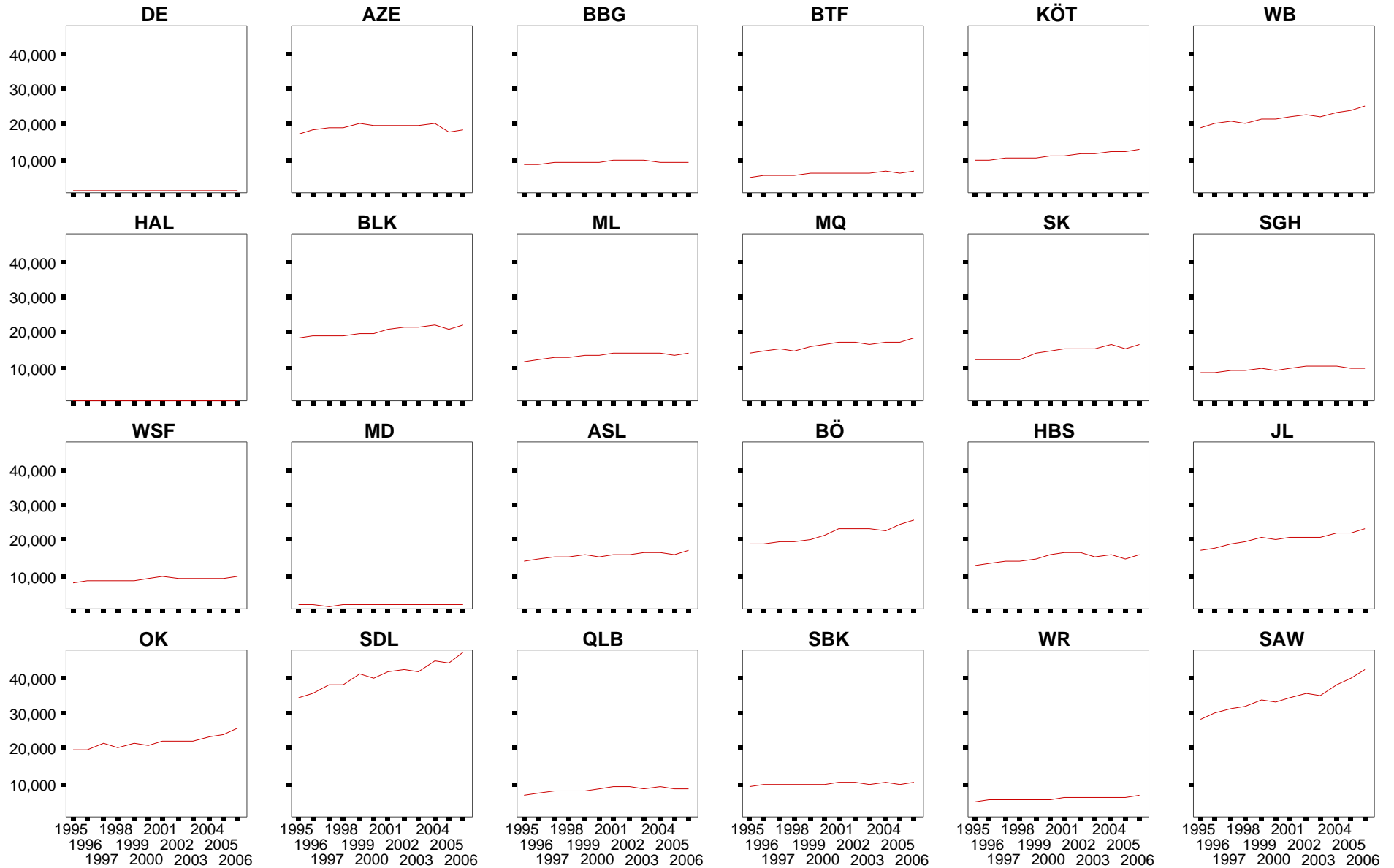
# Conclusions

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- Overall few desirable CAP effects on job maintenance in agriculture
- Slow adjustment of ag employment (2.5 years to move halfway to new steady state)
- Job creation via capital subsidies? (45 thousand euro/ person in short run)
- Modulation questionable on grounds of job creation
- Other CAP goals not considered here, have not made jobs safer

# Data: Example direct payments (1000 EUR)

Source: Zahlstellen des MLU.



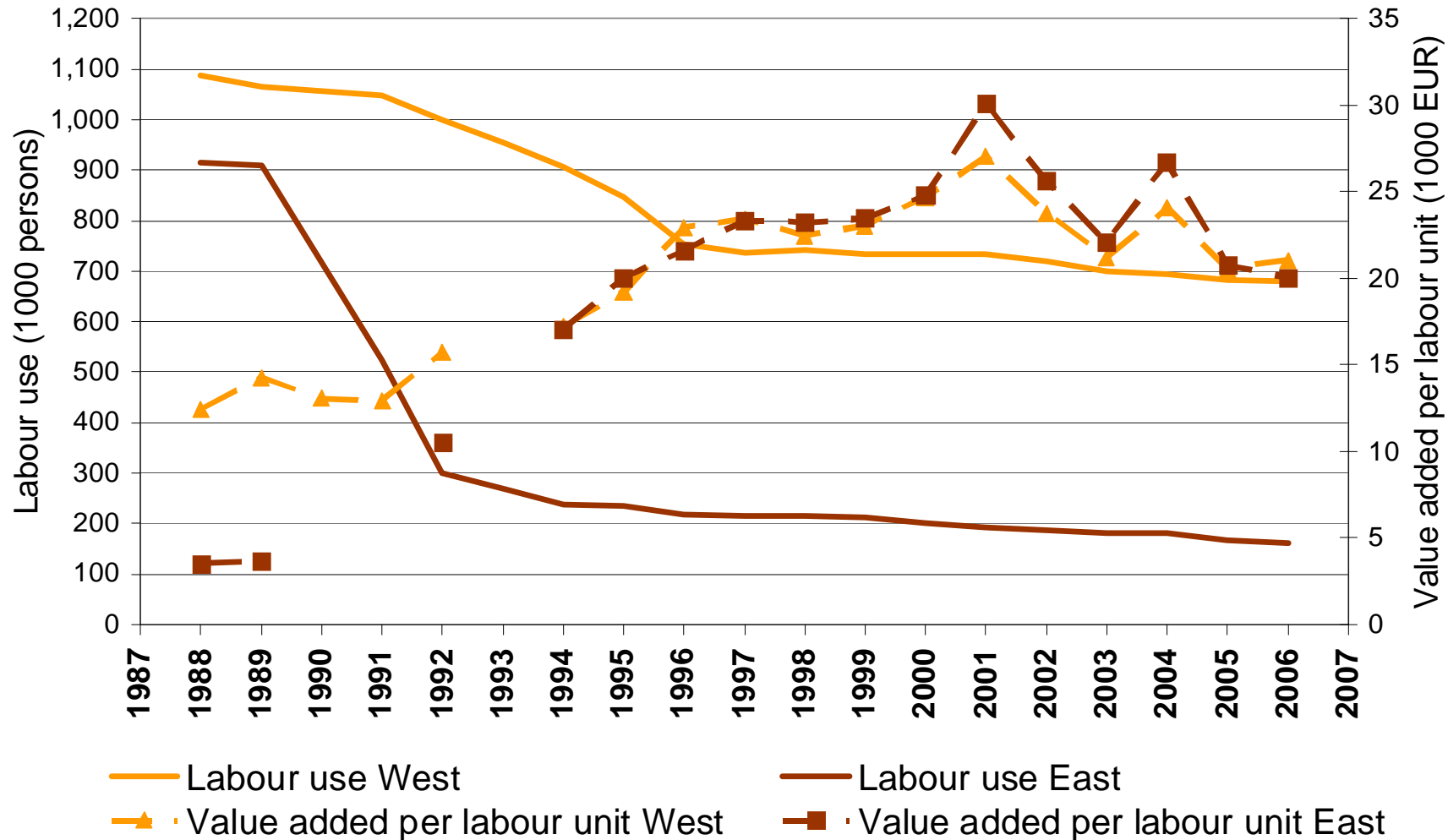


# Political reforms in the period observed

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- Agenda 2000
  - Increase in hectare-payments, simultaneous cuts of administrative prices
  - Increase in beef premia, simultaneous cuts of administrative prices
  - Rural development measures (reg 1257/1999)
- Mid-term Review (after 2005)
  - Stepwise transfer into decoupled single payment scheme (SPS)
  - Modulation, Cross compliance

# Ag labour use & productivity in Germany



Source: Petrick & Zier 2010, based on official statistics.