Impact of Industrial Research and Innovation on Employment Growth

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Outline

- Novel Contributions
- Key Findings
- Comments and Suggestions
- Complementary Evidence
- Policy Implications
- Further Research Questions

Novelties

- **Data**
  - Combines several country specific and cross-country micro and industry data sets

- **Methodological**
  - Distinguishes between different innovation inputs for product and process innovation
    - R&D expenditure – expected to increase employment
    - Embodied technological change –expected to decrease or have no effect on employment

Key Findings

- On the aggregate, a positive but not sizeable effect of innovation expenditures (total and in-house R&D expenditures) on employment

  - The effect is driven by high-tech manufacturing sectors and high-tech firms

- Embodied technological change has no significant effect on employment

- Country specific employment effects – suggest the importance of economic structure and framework conditions
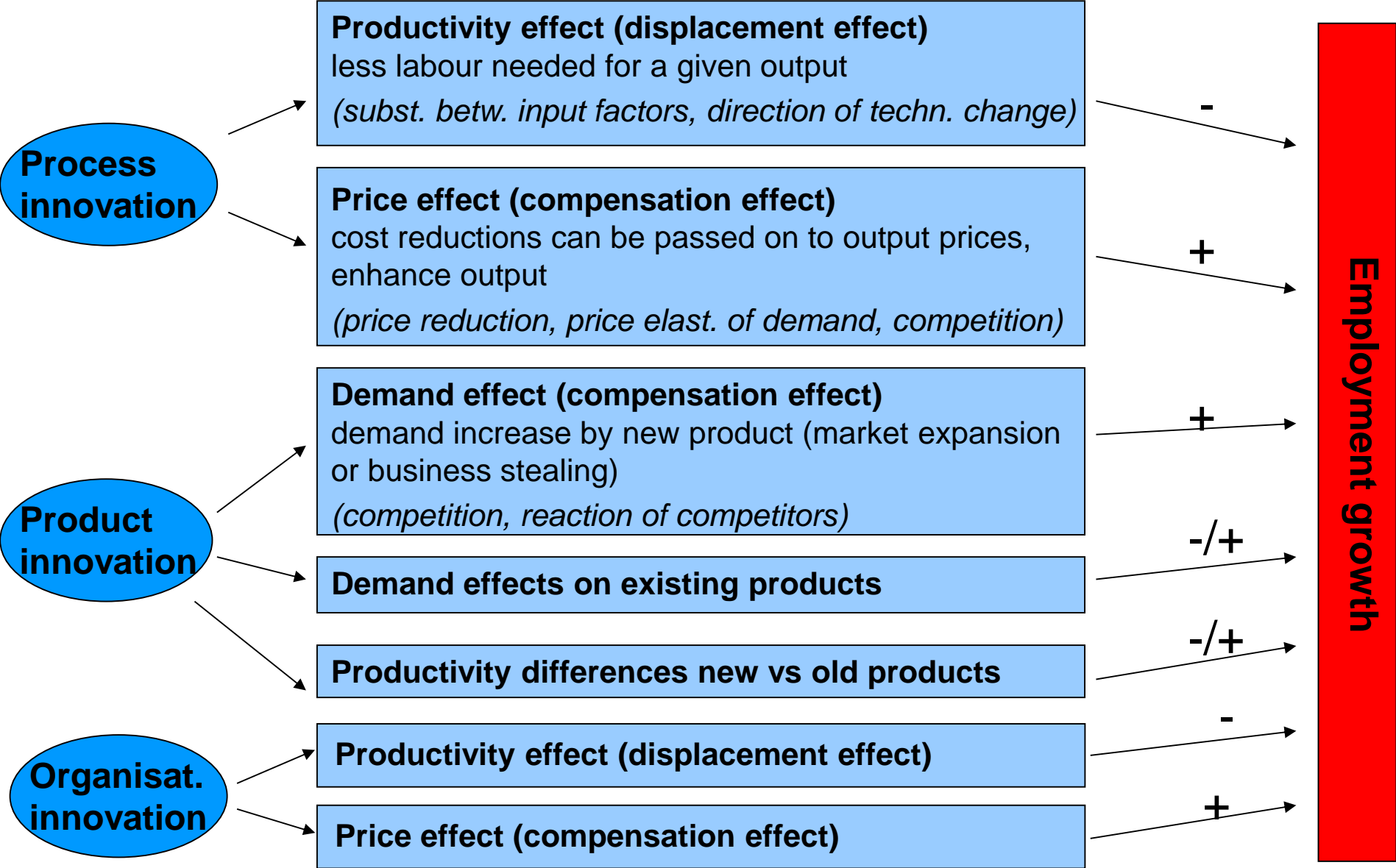
Comments and Suggestions

- Considers only technological innovation – non-technological innovations (organisational and marketing innovations) are increasingly important

- Covers only manufacturing – innovation in services is increasingly important

- Considers the effect of innovation input (expenditures) rather than the effect of innovation outputs on employment growth

- Selection bias due to non-random selection of firms in the analysed sample – needs to be corrected by using weighted regressions

The Influence of Technological and Non-Technological Innovation on Employment Growth in European Service Firms

Bettina Peters, Rebecca Riley, Iulia Siedschlag

SERVICEGAP Discussion Paper 40/2013

Innovation Affects Employment through Various Channels…

Process innovation

Productivity effect (displacement effect)
less labour needed for a given output
(subst. betw. input factors, direction of techn. change)

− →

Price effect (compensation effect)
cost reductions can be passed on to output prices, enhance output
(price reduction, price elast. of demand, competition)

+ →

Product innovation

Demand effect (compensation effect)
demand increase by new product (market expansion or business stealing)
(competition, reaction of competitors)

+ →

Demand effects on existing products

−/+ →

Productivity differences new vs old products

−/+ →

Organisat. innovation

Productivity effect (displacement effect)

− →

Price effect (compensation effect)

+ →

Employment growth

Novelties

Identifies and quantifies across 20 EU countries **the effects of technological and non-technological innovations in services firms on employment growth**

- comparison of employment effects of **product, process and organisational innovation**

- **complementary employment effects** of process and organisational innovation

- **differential effects across service industries** with different technological regimes

- **comparison** with employment effects of innovation in manufacturing

Empirical Approach

Theoretical multi-product model by Harrison et al. (2008)

- Two types of products: old and new (i=1,2)

- Two time periods: in t=1 firms produce the old product; in t=2 firms can introduce a new product which replaces partially or completely the old product

Econometric model

$$l = \alpha_0 + \alpha_1\, pc + \alpha_2\, org + y_1 + \beta y_2 + u$$

l	Employment growth rate
$\alpha_0, \alpha_1, \alpha_2$	Efficiency gains in the production of old products for non-innovators and through process and organisational innovation
pc	Process innovation (dummy: 0/1)
org	Organisational innovation (dummy: 0/1)
y_1, y_2	Output growth rate due to old / new products
u	Error term

Decomposition of Employment Growth

- Based on the estimation results, employment growth can be decomposed as follows:

$$l = \hat{\alpha}_0 + \underbrace{\hat{\alpha}_1 pz} + \underbrace{\hat{\alpha}_2 org} + \underbrace{\left[1 - I(g_2 > 0)\right]\left(g_1 - \tilde{\pi}_1\right)} + \underbrace{I(g_2 > 0)\left(g_1 - \tilde{\pi}_1 + \hat{\beta} g_2\right)} + \hat{u}_{=0}$$

■ Employment growth

■ General productivity trend in production of old products

■ Contribution of process innovation

■ Contribution of organisational innovation

■ Output growth due to old products

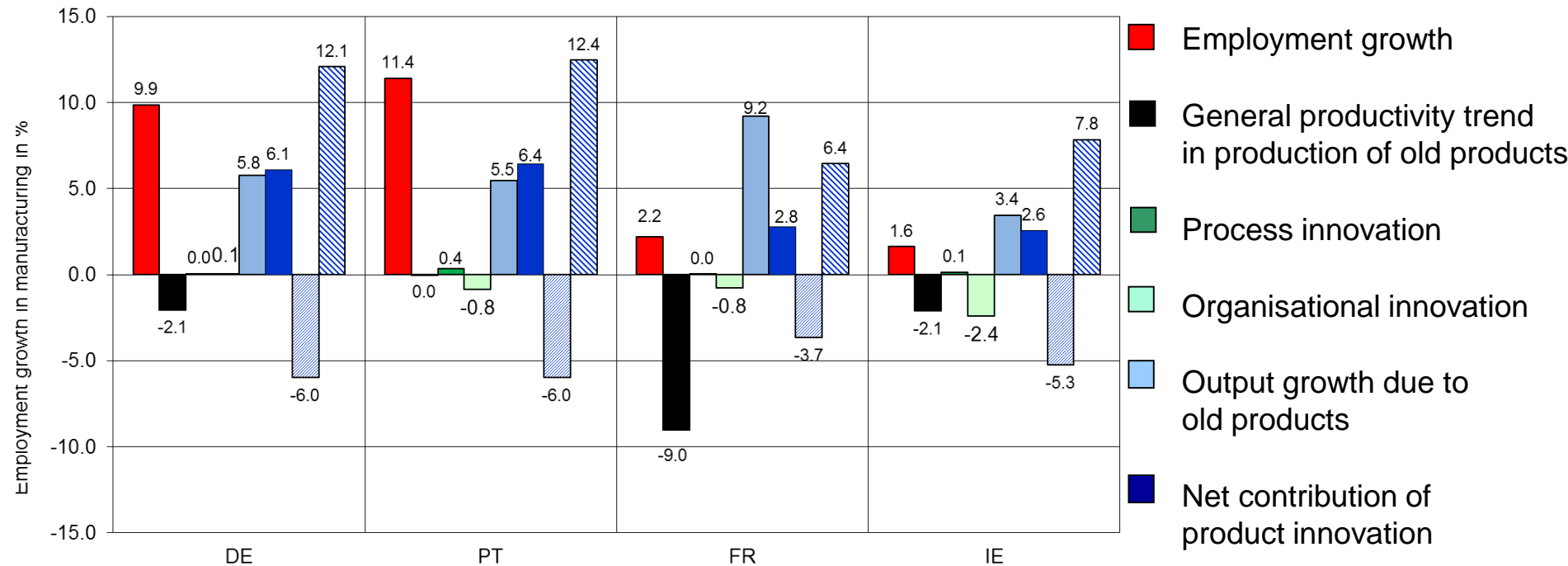■ Net contribution of product innovation

Data

- **Community Innovation Surveys** 1998-2008
- 20 EU countries
- **Service sectors**: wholesale, transport, telecommunication, computer and related activities, R&D, financial intermediation, business services, media
- **Enterprises** with 10 or more employees
- **Estimation method**: weighted IV regression

Key Findings

- **Product innovation** is linked to job creation – market novelties slightly more important than firm novelties
- **Process innovation** - no significant employment effects
- **Organisational innovation** - no significant or negative employment effects
- **No complementary effects** between process and organisational innovation
- Overall, employment effects in services firms are **smaller** than in manufacturing firms

Contribution of Innovation to Employment Growth: Country-Specific Effects
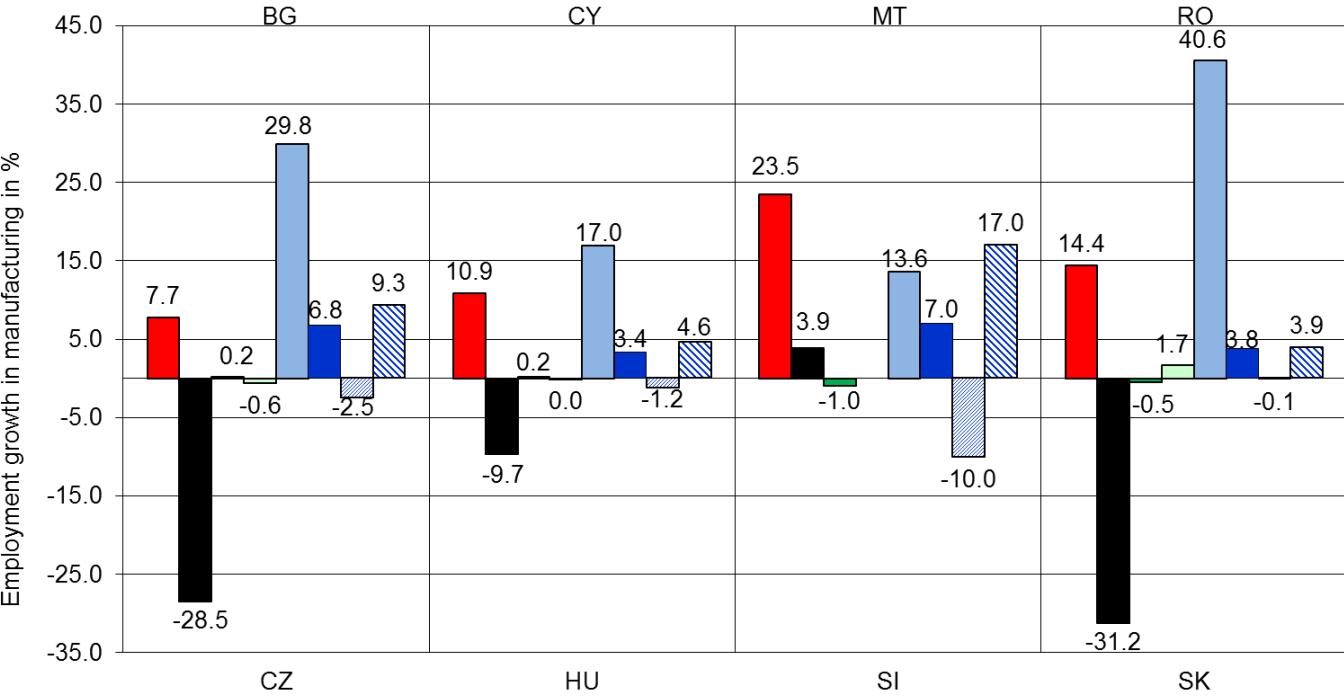

- DE, PT: Product innovations contribute more to employment growth than old products

- FR, IE: Product innovations contribute less than old products

- In all other Western European countries: product innovations have contributed positively to employment growth but less than old products

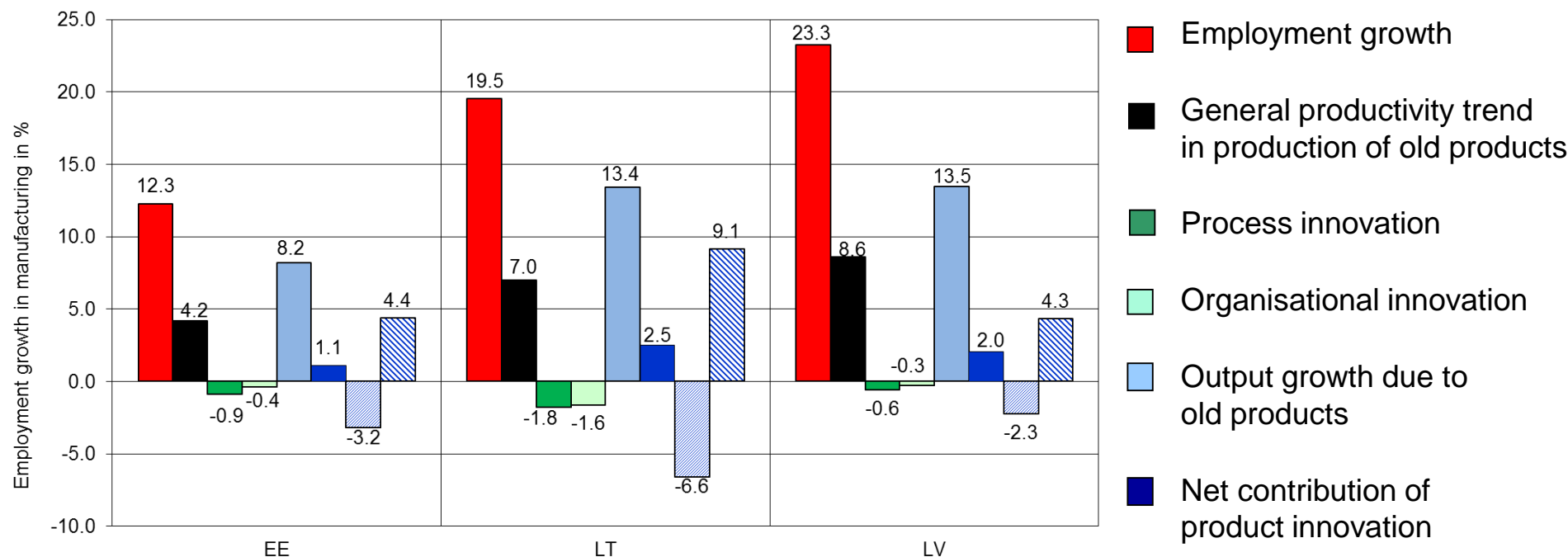*Source*: Peters, Riley and Siedschlag (2013)
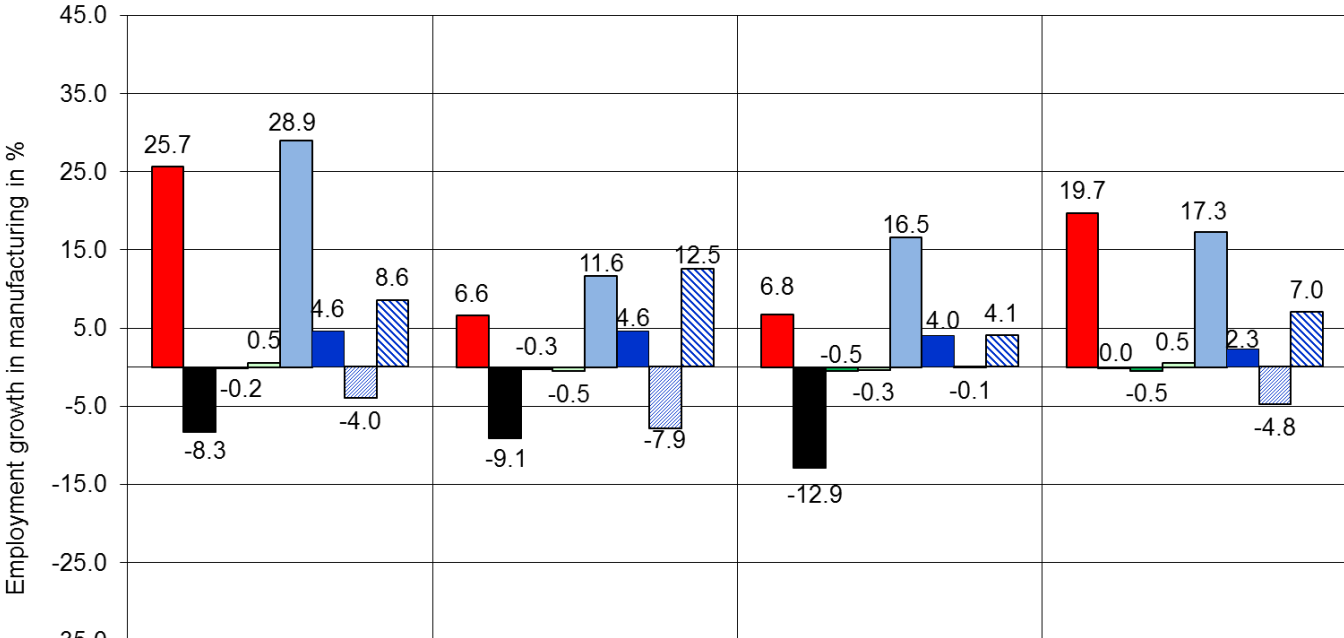
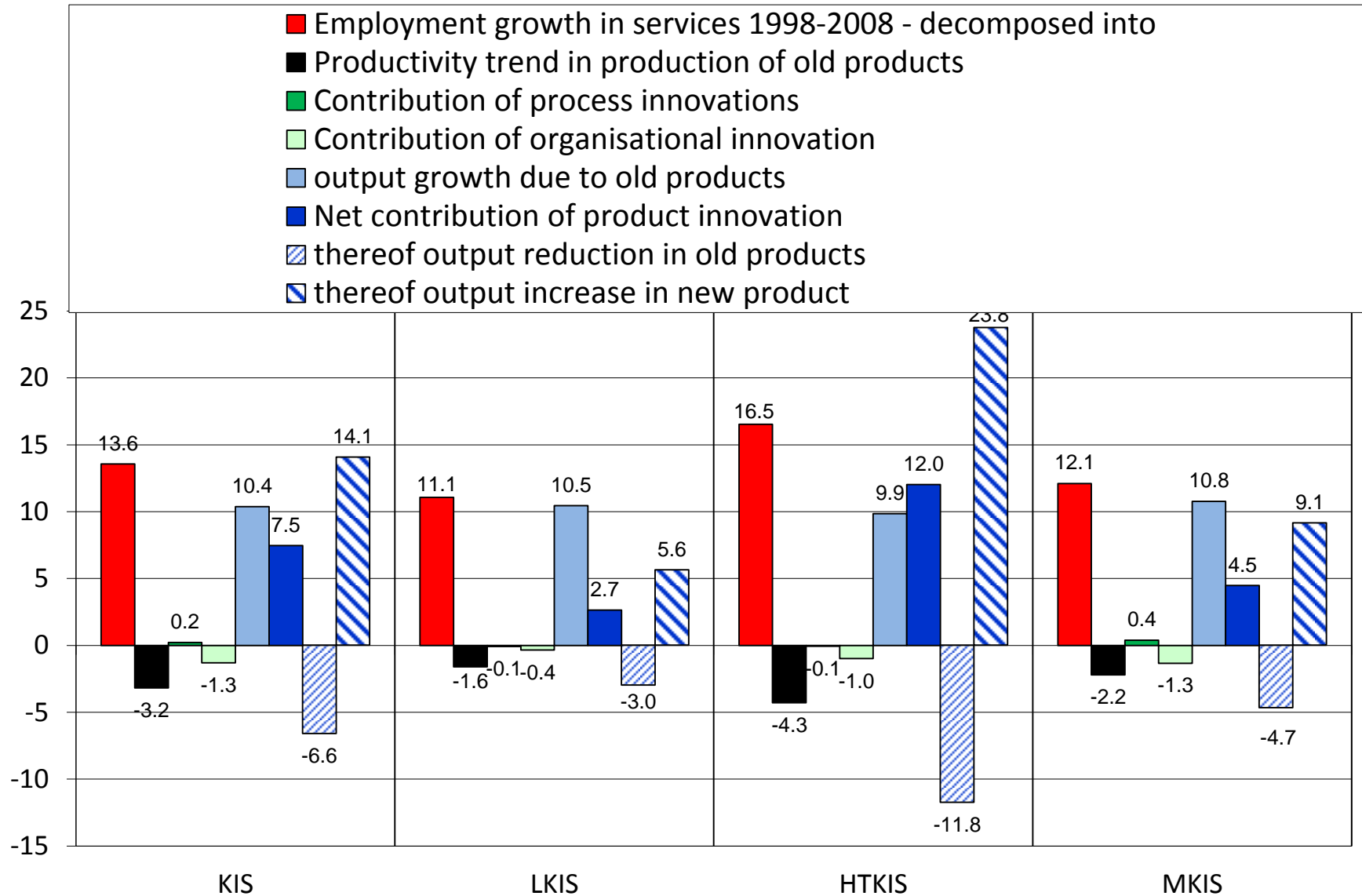**Contribution of Innovation to Employment Growth: Country-Specific Effects**

Contribution of Innovation to Employment Growth: Country-Specific Effects

Source: Peters, Riley and Siedschlag (2013)

Innovation and Employment Growth – Sector Specific Effects

Legend:
- ■ (red) Employment growth in services 1998-2008 - decomposed into
- ■ (black) Productivity trend in production of old products
- ■ (green) Contribution of process innovations
- □ (light green) Contribution of organisational innovation
- □ (light blue) output growth due to old products
- ■ (blue) Net contribution of product innovation
- ▨ (hatched light blue) thereof output reduction in old products
- ▨ (hatched blue) thereof output increase in new product

	KIS	LKIS	HTKIS	MKIS
Employment growth (red)	13.6	11.1	16.5	12.1
Productivity trend (black)	-3.2	-1.6	-4.3	-2.2
Process innovations (green)	0.2	-0.1	-0.1	0.4
Organisational innovation (light green)	-1.3	-0.4	-1.0	-1.3
Output growth old products (light blue)	10.4	10.5	9.9	10.8
Net contribution product innovation (blue)	7.5	2.7	12.0	4.5
Output reduction old products (hatched)	-6.6	-3.0	-11.8	-4.7
Output increase new product (hatched)	14.1	5.6	23.8	9.1

Policy Implications

- **Targeted policy measures** to enable product innovation - could foster employment growth

- Productivity enhancing innovation could lead to job destruction – labour market **policy measures to compensate** these negative effects are important

- **One policy does not fit all** countries, industries, firms – need for targeted tailored policy measures

Further Research Questions

- How do different innovation type combinations /complementarities impact on job creation?

- What types of firms are more likely to translate innovation into job creation?

- What framework conditions enable a positive link between innovation and job creation?

Services Classification

Sector	NACE		Subsector
KIS	64	post and telecommunication	**HTKIS**
	72	computer and related activities	
	73	R&D	
	61	water transport	**MKIS**
	62	air transport	
	70	real estate	
	71	renting	
	74	business related activities	
	65-67	financial intermediation	FKIS
	92	media	OKIS
LKIS	51	wholesale	
	60	land transport	
	63	supporting transport activities	

Source: *Eurostat*