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SHIFT-SHARE ANALYSIS OF EMPLOYMENT GROWTH WITHIN THE EU COUNTRIES IN 1999-2005

Abstract

In the paper the dynamics of total and sectoral employment in EU countries is analyzed through identification of two components: sectoral-mix effect and competitive effect. In case of economies in transition in Central and Eastern Europe, one could expect (assuming similar pattern of employment changes as within EU-15) the quicker decrease of agriculture employment, the acceleration of employment growth in market services, the slowdown of employment growth in non-market services and further decrease of employment in processing industry. Although there were differences in both examined effects it is worth to mention that almost all countries composed practically one cluster. The shift-share approach is applied in order to do this research. It turned out that the largest part of variation in relative employment growth is explained by the competitive effect and only small part is explained by the sectoral-mix effect.

Key words: labour market, employment growth, shift-share analysis.
JEL classification: J21.

Introduction

The structure of the economy is subject to incessant changes in time (i.e. Lange, 1977). This is especially visible in the case of the analysis such economic categories like the national income, the productivity, labour costs or the employment. The distinct changes during last decades are noticeable as far as the sectoral structure of economies is concerned. This phenomenon occurs with reference to both shaping of produced value added and employment in each economic section.

Changes of the sectoral structure of the employment occur dynamically in countries in transition. Economic transition in these countries has been associated with the reallocation of labour and jobs across economic sectors. One part of this process has been a shift of resources, including labour, from the public to the private sector. Another part has been the movements of labour across industries. It is worth to mention that jobs that are created in expanding sectors usually require different skills and are located in different regions than jobs that are destroyed in declining sectors (Rutkowski, 2006).

The mentioned changes consist first of all in the increase of the participation of the service employment in the total employment (especially market services (Batóg, Batóg, 2001)) and in the change of the wages structure (Keynes, 2003). The intensity of structural changes in economy depends mainly on individual's labour mobility, which is driven not only by economic determinants but also by demographic ones (Merkle, Zimmermann, 1994).

It is often presumed that the share of services in real GDP might exhibit an influence on the employment intensity of growth. The main reason of this influence is lower average labour productivity in the services sector than in the industrial sector of an economy. A more prominent role for services corresponds to a higher employment intensity of growth (OECD Employment Outlook, 2000).

The correlations between changes in labour productivity and in employment are negative and strongly significant, especially across the whole non-farm business sector. Labour productivity growth across sectors have been mainly driven by employment adjustments, with some high productivity-growth industries reducing employment and some low productivity-growth industries, especially in the service sector, increasing it. Within manufacturing, the relationship between labour productivity and employment is relatively weaker because the quality of labour input is more important, *i.e.* skill-biased employment adjustment has been at work in firms recording comparatively strong productivity increases (Scarpetta, Bassanini, Pilat, Schreyer, 2000).

In case of economies in transition in Central and Eastern Europe, one could expect (assuming similar pattern of employment changes as within EU-15) the quicker decrease of agriculture employment, the acceleration of employment growth in market services, the slow-down of employment growth in non-market services and further decrease of employment in processing industry (Karpiński, Paradysz, Ziemiecki, 1999). These phenomena are very important because employment structure in the economy determines its competitive power and growth potential.

In the paper the dynamics of total and sectoral employment in EU countries will be analyzed through identification of two components: sectoral-mix effect and competitive effect. The shift-share approach will be applied in order to do this.

Data

The sample consists of 24 European countries – members of European Union excluding Malta because of lack of reliable data. The data comes from Eurostat Database and covers period 1999–2005. The research was conducted in two kinds of industry classification according to ISIC Rev. 3[1]. The first division corresponds to 3 sectors:

1. Agriculture,
2. Industry,
3. Services.

The second division includes 6 following sectors and subsectors:

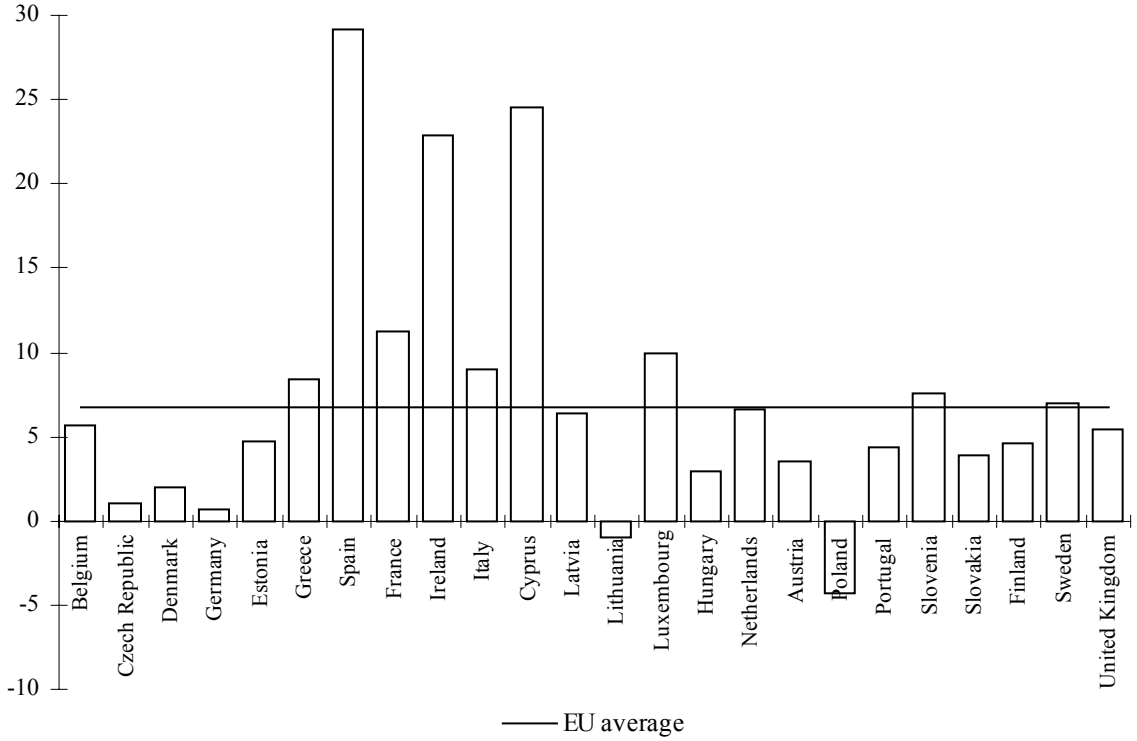
1. Agriculture, hunting, forestry and fishing,
2. Total industry (excluding construction),
3. Construction,
4. Wholesale and retail trade, repair of motor vehicles, motorcycles and personal and household goods; hotels and restaurants; transport, storage and communication,
5. Financial intermediation; real estate, renting and business activities,
6. Public administration and defense, compulsory social security; education; health and social work; other community, social and personal service activities; private households with employed persons; extra-territorial organizations and bodies.

Figure 1 represents annualized total employment growth during 1999-2005 for 24 European Union countries. The greatest growth was observed in Spain, Cyprus and Ireland. For Poland and Lithuania the growth rates were negative. For all countries employment

[1] Decomposition into 3 and 6 sectors was intended as a test of robustness of the used procedure.

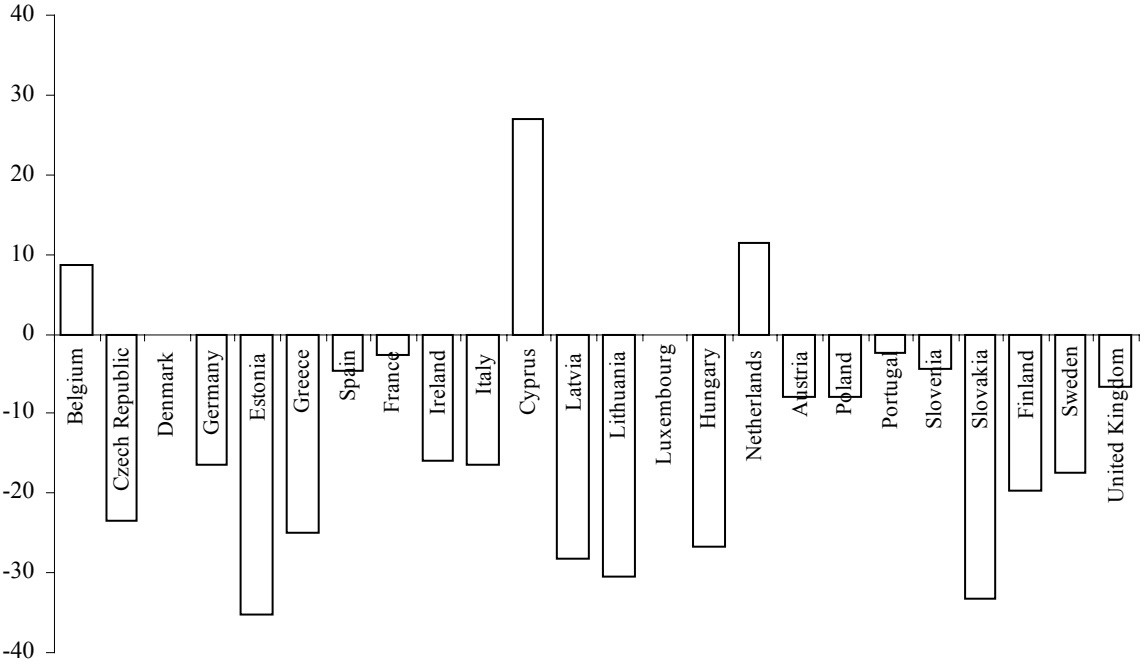
growth was mostly due to increased service employment (see Figure 2-4). The agriculture employment decreased for almost all countries (apart from Belgium, Cyprus and Netherlands). Above results suggest the service sector as a main source of future employment growth in European economies.

Figure 1. The annualized total employment growth in EU in 1999-2005 (in percentage points)



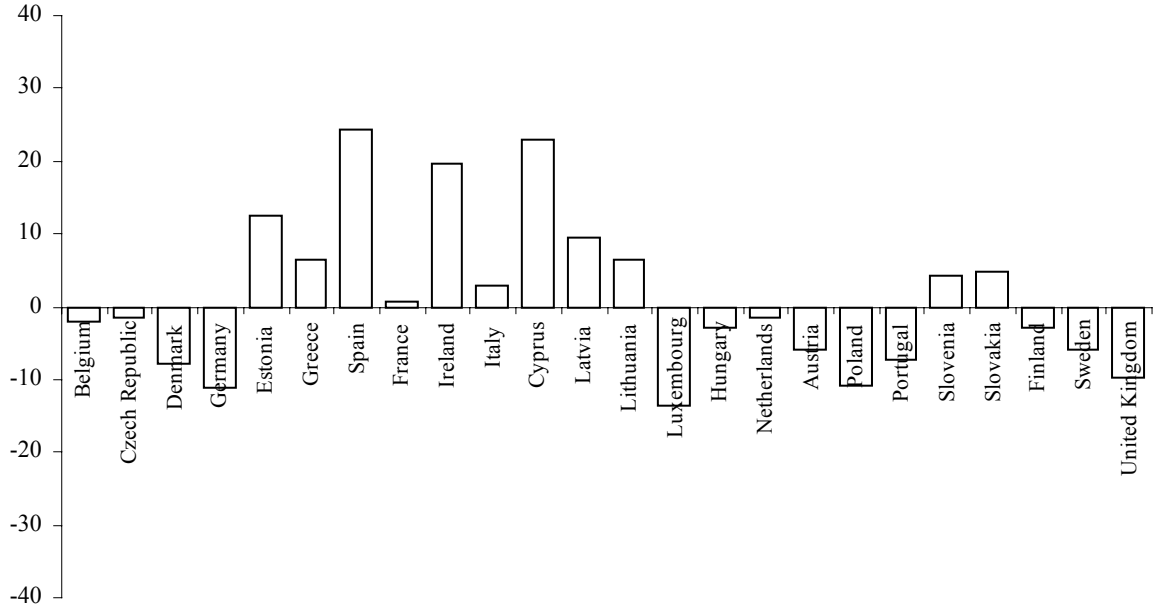
Source: own calculation.

Figure 2. Sectoral contributions to annualized employment growth in EU in 1999-2005 (in percentage points) – *Agriculture*



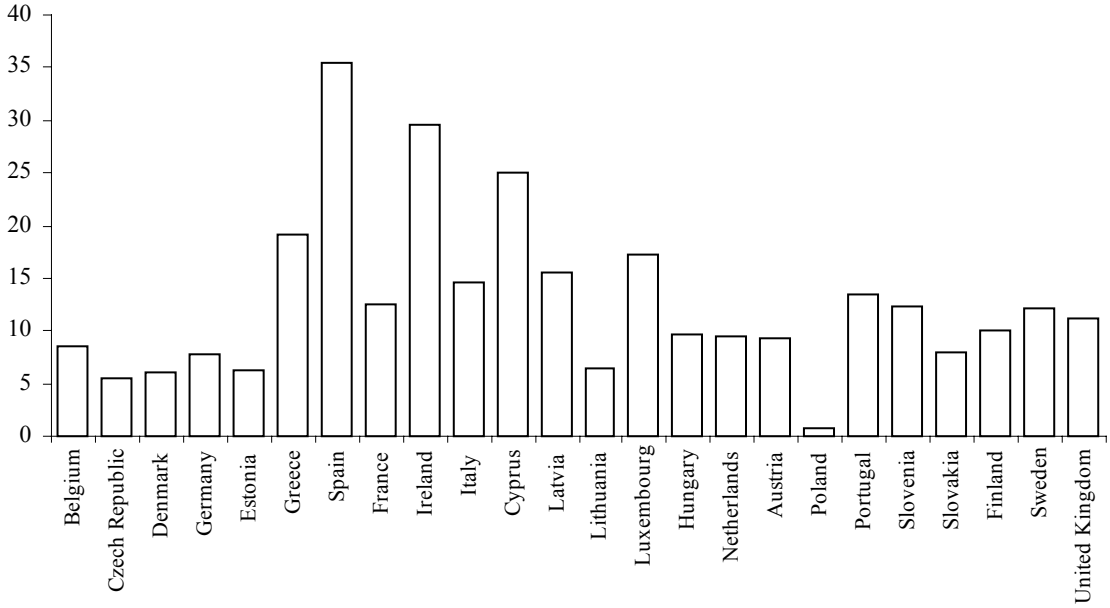
Source: own calculation.

Figure 3. Sectoral contributions to annualized employment growth in EU in 1999-2005 (in percentage points) – *Industry*



Source: own calculation.

Figure 4. Sectoral contributions to annualized employment growth in EU in 1999-2005 (in percentage points) – *Services*



Source: own calculation.

Methodology

Shift-share analysis provides a more comprehensive assessment of international differences in employment growth. This approach was firstly used by Creamer (*U.S. National Resources* …, 1942) and was expounded and used on a large scale by Dunn (Harvey, Perloff, Dunn, Lampard, Muth, 1960) as a method for the determination of the components explaining the variations in economic magnitudes, mainly the employment.

Shift-share analysis can provide an assessment of the links between the sectoral mix of employment and international differences in employment growth (Ray, Harvey, 1995). A necessary condition is therefore that the examined variable can be subdivided into groups and expressed as a weighted mean of its values in those groups. The change in the variable between two periods may be explained in terms of their variation in the weights of the different groups (structural component) or a modification of its values (internal component)[2]. The difference in the total growth of employment between a country *i* and average growth for the whole sample can be divided into three effects:

- *sectoral-mix effect*: measures the impact of differences between the initial sectoral structure of employment in country *i* and the structure of overall sample,
- *competitive effect*: measures the impact of differences between the sector specific growth rates in country *i* and the sector specific rates averaged for all countries,
- *residual effect*[3]: measures if the employment growth of country *i* tends to be higher, relative to all countries, in the sectors in which the country *i* is specialized.

All the above effects can be calculated using the following measures[4]:

- annualised employment growth (EG_i) in country *i*:

$$EG_i = \sum_{j=1}^{s}(N_{ijT} - N_{ij0})/(T \cdot \sum_{j=1}^{s} N_{ij0}),$$

where:
s – number of sectors,
N_{ijt} – employment in country *i*, sector *j* and time *t*,

- sectoral contribution (SC_{ji}) to annualised employment growth of sector *j* in country *i*:

$$SC_{ji} = EG_{ij} \cdot w_{ij0},$$

where:

EG_{ij} – employment growth in country *i* and sector *j*: $EG_{ij} = (N_{ijT} - N_{ij0})/(T \cdot \sum_{j=1}^{s} N_{ij0})$,

w_{ij0} – share of sector j in total employment at time 0: $w_{ij0} = N_{ij0} / \sum_{j=1}^{s} N_{ij0}$,

- employment growth (CID_i) in country *i* assuming a common initial distribution of sectors:

$$CID_i = \sum_{j=1}^{s} EG_{ij} \cdot \overline{w}_{j0},$$

where:

$\overline{w}_{j0}$ – employment share of sector j in total sample at time 0: $\overline{w}_{j0} = \sum_{i=1}^{n} N_{ij0} / \sum_{i=1}^{n}\sum_{j=1}^{s} N_{ij0}$,

n – number of countries,

- employment growth (CSG_i) in country *i* assuming common sectoral growth rates:

$$CSG_i = \sum_{j=1}^{s} \overline{EG}_j \cdot w_{ij0},$$

where:

$\overline{EG}_j$ – annualized employment growth of sector *j* in total sample:

[2] Murillo, Núñez, Usabiaga, 2005.
[3] This term is sometimes interpreted as a measure of the extent to which a country is specialized in those sectors in which it has a competitive advantage (Ray,Harvey, 1995).
[4] OECD Employment Outlook 2000.

$$\overline{EG_j} = \left(\sum_{i=1}^{n} N_{ijT} - \sum_{i=1}^{n} N_{ij0} \right) / (T \cdot \sum_{i=1}^{n} N_{ij0}),$$

and finally we can derive:

competitive effect (CE_i) in country *i*: $CE_i = CID_i - \overline{EG}$,

sectoral-mix effect (SE_i) in country *i*: $SE_i = CSG_i - \overline{EG}$,

residual effect (R_i) in country *i*: $R_i = REG_i - CE_i - SE_i$,

where:

REG_i – relative annualized employment growth in county *i*: $REG_i = EG_i - \overline{EG}$.

Empirical results

Tables 1 and 2 present the shift-share decomposition of relative employment growth for division into 3 and 6 sectors accordingly. Countries are listed in descending order of their relative annualized employment growth. The obtained results are very similar for both divisions. The competitive effect explains the largest part of cross-country variation in employment growth – correlation coefficients between relative annualized employment growth and this effect are equal to 0,97 (3 sectors) and 0,95 (6 sectors). The sectoral-mix effect as well as the residual effect are relatively small for almost all countries and are not correlated with annualized total employment growth. It means that initial sectoral structure in 1999 had very little meaning for international differences in employment growth pattern over the analyzed period.

Table 1. Shift-share analysis of employment growth (3 sectors), 1999-2005

	REG_i	**CE_i**	**SE_i**	**R_i**
Spain	3,79%	3,89%	-0,07%	-0,03%
Cyprus	3,03%	3,01%	0,19%	-0,17%
Ireland	2,73%	2,92%	-0,07%	-0,11%
Luxembourg	0,63%	0,11%	0,35%	0,17%
Italy	0,44%	0,47%	-0,05%	0,02%
France	0,38%	0,27%	0,16%	-0,04%
Greece	0,32%	1,06%	-0,30%	-0,43%
Slovenia	0,17%	0,40%	-0,37%	0,14%
Netherlands	0,12%	-0,02%	0,29%	-0,16%
Sweden	0,05%	-0,24%	0,24%	0,06%
Latvia	-0,01%	0,79%	-0,36%	-0,45%
Belgium	-0,12%	-0,18%	0,24%	-0,18%
United Kingdom	-0,16%	-0,43%	0,27%	0,00%
Estonia	-0,29%	-0,13%	-0,15%	-0,02%
Finland	-0,30%	-0,33%	0,04%	-0,01%
Portugal	-0,35%	-0,01%	-0,38%	0,04%
Slovakia	-0,45%	-0,31%	-0,26%	0,12%
Austria	-0,47%	-0,46%	-0,02%	0,00%
Hungary	-0,59%	-0,44%	-0,14%	0,00%
Denmark	-0,70%	-0,81%	0,19%	-0,08%
Czech Republic	-0,90%	-0,80%	-0,23%	0,14%
Germany	-0,95%	-0,95%	0,03%	-0,02%

Lithuania	-1,23%	-0,36%	-0,49%	-0,38%
Poland	-1,80%	-1,60%	-0,51%	0,31%

Source: own calculation.

Table 2. Shift-share analysis of employment growth (6 sectors), 1999-2005

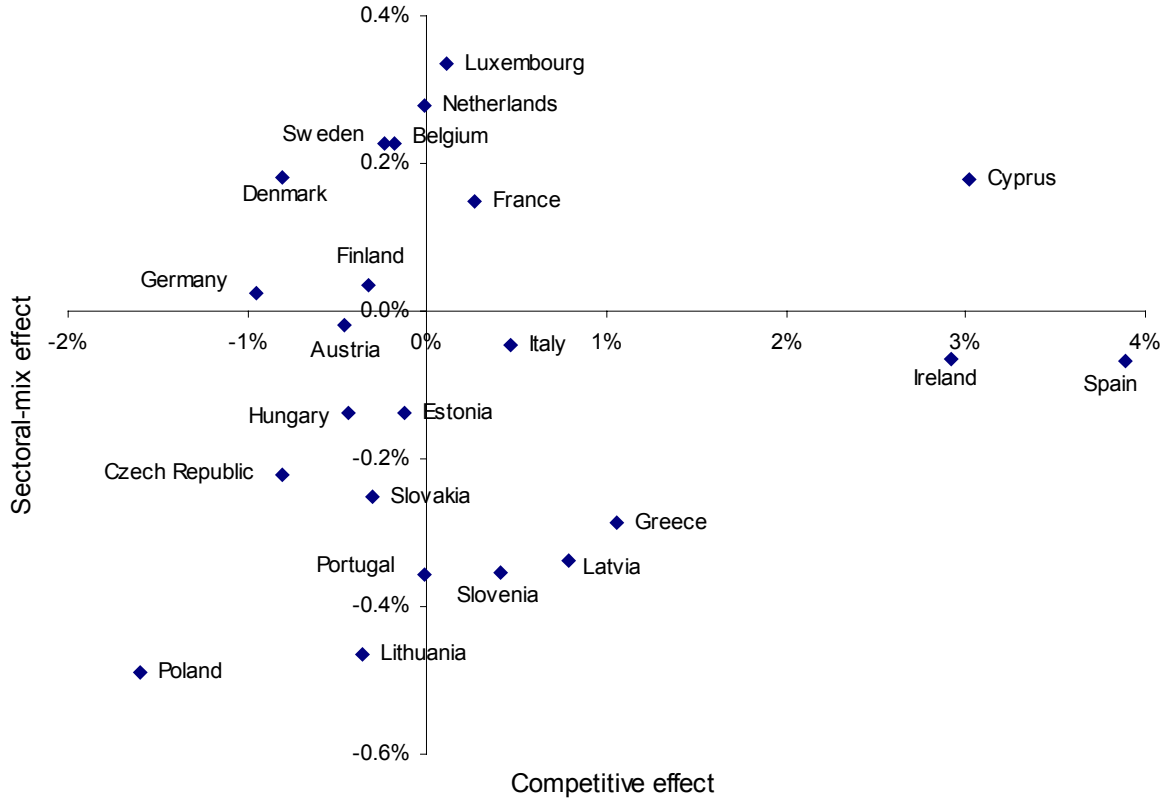
	REGi	**CEi**	**SEi**	**Ri**
Spain	3,79%	3,84%	-0,06%	0,00%
Cyprus	3,04%	3,25%	0,19%	-0,39%
Ireland	2,74%	2,77%	-0,02%	-0,01%
Luxembourg	0,64%	-0,19%	0,56%	0,27%
Italy	0,44%	0,55%	-0,09%	-0,02%
France	0,38%	0,26%	0,19%	-0,06%
Greece	0,32%	1,16%	-0,38%	-0,46%
Slovenia	0,17%	0,63%	-0,53%	0,07%
Netherlands	0,12%	-0,03%	0,39%	-0,24%
Sweden	0,05%	-0,25%	0,27%	0,04%
Latvia	-0,01%	1,02%	-0,47%	-0,56%
Belgium	-0,12%	-0,21%	0,24%	-0,15%
United Kingdom	-0,16%	-0,45%	0,34%	-0,06%
Estonia	-0,29%	-0,04%	-0,24%	-0,01%
Finland	-0,30%	-0,34%	0,05%	-0,01%
Portugal	-0,35%	0,03%	-0,40%	0,02%
Slovakia	-0,45%	0,06%	-0,37%	-0,14%
Austria	-0,48%	-0,41%	-0,04%	-0,03%
Hungary	-0,59%	-0,19%	-0,27%	-0,13%
Denmark	-0,70%	-0,82%	0,22%	-0,10%
Czech Republic	-0,90%	-0,70%	-0,32%	0,13%
Germany	-0,95%	-0,97%	0,04%	-0,02%
Lithuania	-1,23%	-0,15%	-0,60%	-0,48%
Poland	-1,80%	-1,476%	-0,61%	0,27%

Source: own calculation.

Figures 5 and 6 illustrate competitive and sectoral-mix effects for all analyzed countries in two variants of sectoral divisions. In case of Cyprus, Ireland and Spain competitive effect accounted for high of the international differences in employment growth. The largest negative values of sectoral-mix and competitive effects are associated with Poland.

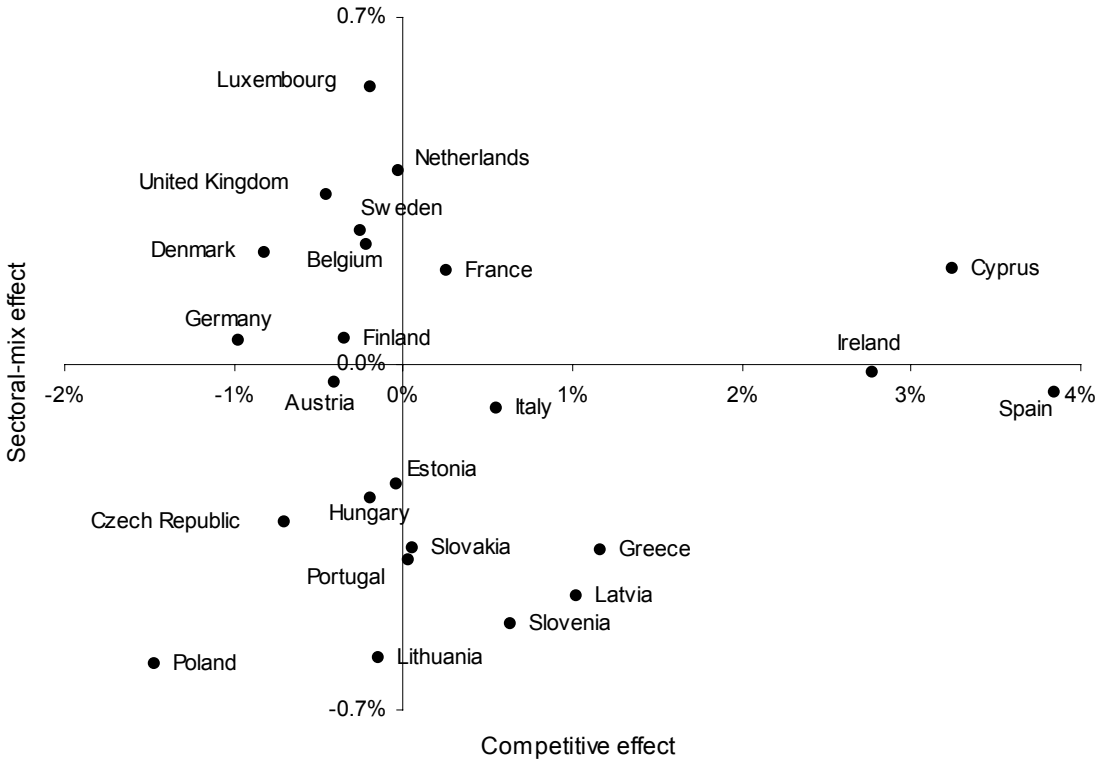
The taxonomy of countries according to positive and negative values of sectoral-mix and competitive effects is presented in Tables 3 (3 sectors) and 4 (6 sectors). The results are very similar because only three countries (Luxembourg, Portugal and Slovakia) have changed their groups but the changes in observed values of both effects were not considerable.

Figure 5. Competitive and sectoral-mix effects (3 sectors)



Source: own calculation.

Figure 6. Competitive and sectoral-mix effects (6 sectors)



Source: own calculation.

Table 3. Group of countries with positive or negative values of sectoral-mix effect and competitive effect (3 sectors)

CE (+) SE (+)	CE (+) SE (-)	CE (-) SE (+)	CE (-) SE (-)
Cyprus	Greece	Belgium	Austria
France	Ireland	Denmark	Czech Republic
Luxembourg	Italy	Finland	Estonia
	Latvia	Germany	Hungary
	Slovenia	Netherlands	Lithuania
	Spain	Sweden	Poland
		United Kingdom	Portugal
			Slovakia

Source: own calculation.

Table 4. Group of countries with positive or negative values of sectoral-mix effect and competitive effect (6 sectors)

CE (+) SE (+)	CE (+) SE (-)	CE (-) SE (+)	CE (-) SE (-)
Cyprus	Greece	Belgium	Austria
France	Ireland	Denmark	Czech Republic
	Italy	Finland	Estonia
	Latvia	Germany	Hungary
	Portugal	Luxembourg	Lithuania
	Slovakia	Netherlands	Poland
	Slovenia	Sweden	
	Spain	United Kingdom	

Source: own calculation.

Conclusions

The cross-country comparisons demonstrate that employment growth rates differ significantly within the European Union countries. It is caused by the sustained decrease in the agriculture employment (with the exceptions for Belgium, Cyprus and Netherlands) together with the sustained increase of service employment.

There is no statistically significant correlation between the sectoral-mix effect and relative employment growth. It means that initial structure of employment in European countries had no influence on relative growth rates of overall employment. So small sectoral-mix effect could be connected with the choice of initial structure as a base for comparison of employment growth. Instead of that approach one could consider the sectoral structure of employment for last year of analyzed period. It seems that present sectoral structure could be better base of comparisons if we assume favorable changes of sectoral employment pattern.

In that case the largest part of variation in relative employment growth is explained by the competitive effect. It means that in the countries with higher rates of employment growth there were visible above-average growth rates across all sectors.

Although there were differences in both examined effects it is worth to mention that almost all countries composed practically one cluster.

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