Employment Specialization in the Enlarged European Union

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1. Introduction

In this paper we aim at describing specialization patterns in the employment structures of European Union countries. The main motivation for our study is twofold: we aim at providing the empirical evidence on the evolution of the phenomena in the light of European integration process and to check if along the process of growth economic structures of EU countries—both 'Old' and 'New' Member States—become more or less exposed to risk. We focus on one of the aspects of economic specialization, namely the quantitative[1] measurement of the degree of concentration of employment activity in a few sectors within single European countries. We test empirically if the hypothesis of a nonlinear relationship between development level and the degree of specialization, put forward in the literature, is confirmed in the EU setting.

The degree of diversification has been indicated as an important factor influencing risk and economic efficiency. Traditional Smithian approach would see specialization as a positive phenomenon, leading to more effective use of resources and productivity gains. Moreover, positive exploitation of economies of scale requires concentration of resources in fewer sectors. However, major specialization (thus lower degree of economic diversification) can be dangerous from the point of view of exposition to sector-specific shocks where risk sharing is crucial (Kalemli-Ozcan *et al.* 2003, Koren and Tenreyro, 2007). What is especially important is the evolution of economic structures along the process of economic development because the argument of major risk associated with highly specialized economic structures can be particularly dangerous in case of poor countries. GDP per capita growth usually goes hand in hand with better diversification opportunities, mainly due to the improvement of investment climate (Acemoglu and Zilibotti, 1997).

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[1] An alternative, qualitative view on specialisation requires the examination of the *nature* of sectors (seen from the perspective of skill or technology content) in which economic activity is concentrated. Such approach has been especially adopted to the study of trade patterns (among others: Amable, 2000, Hausmann *et al.* 2007).

From the theoretical point of view, the link between economic growth and economic structure can be analysed through economic growth models with an expanding product variety (Grossman and Helpman, 1991: 43–83). As output grows, there is no substitution among intermediate inputs, but rather new inputs add to old ones, so that there is a continuous expansion of the number of inputs in the form of intermediate goods. Major diversification of internally produced goods means also that economic structure of a developing country has to become more diversified. Such a process requires good conditions for expanding product variety (human capital, availability of resources, funding possibilities, R&D), thus we can expect that less diversified structure of economic activity (higher overall specialization) can be associated with lower levels of per capita output. In fact, recent empirical analysis of industrial specialization at international level (Imbs and Wacziarg, 2003; Koren and Tenreyro, 2007) revealed a tendency towards increasing diversification at low levels of development, interestingly matched with the reversal of the trend at higher stages of development (U shaped pattern of specialisation).

Despite the importance of the question, there is still not so much research on that subject which refers to the European economies. Amiti (1999) in one of the first empirical papers assessing specialization patterns in Europe found the evidence of increasing specialization in 10 EU countries (namely: Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Portugal, Spain and the UK). Comparing individual structures of former EU15 countries with that of the average of the rest of the EU (relative patterns of specialization), it has been found that through the 70s most countries became less specialized while during the 80s all EU15 countries except Netherlands experienced an increase in specialisation becoming increasingly different from the rest of the EU (Midelfart-Knarvik et al. 2000).

Many existing studies focus rather on the locational aspects of economic activity in Europe and analyze *geographical concentration* patterns. While *specialization* measures "the extent to which a given country specialises its activities in a small number of industries or sectors", the concept of geographical concentration is defined as "the extent to which activity in a given industry is concentrated in a few countries" (Aiginger and Davies, 2004). Brülhart (1998) states that as far as manufacturing employment structures are concerned, European industry has become increasingly localized in the 1980s with increasing returns industries concentrated rather in the economic core of the EU at that time. Over the period 1972–1996, the degree of employment concentration increased, especially before the launch of the Single Market program (Brülhart, 2001). As for the effects of spatial concentration of industries in Europe in terms of its impact on productivity, Ciccone (2002) finds that in selected West-European economies (Germany, Italy, France, Spain and the UK) doubling the employment density (meaning an increase in the concentration of resources in fewer sectors) may increase average labour productivity by approximately 5 percent. Such regional agglomeration effects were slightly lower than in the USA and did not varied substantially across western European countries.

After the recent enlargements, resulting in the accession of countries on much lower stages of development and having different economic structures than 'old' Member States, the theme of specialisation in the European Union has became particularly important. The question has gained even major importance in the light of monetary integration where the similarity of economic structures among partners belonging to the same monetary area and risk factors associated with low degree of diversification (danger of asymmetric shocks) are among crucial elements of risk sharing.

Surprisingly, to our knowledge, there is no empirical research systematically addressing the issue of employment specialization and its evolution along the development paths in both 'old' and 'new' Member States. We aim at filling this gap. Drawing on the sectoral data covering the time span of 25 years in case of EU15 countries (1970–2004) and 10 years for the group of ten New Member States (1995–2004), we provide a complete assessment of employment specialisation in the enlarged European Union and its link with the development process. We are especially interested in matching the changes in the degree of employment diversification with the stages of economic growth, mainly in order to check if European countries move towards less or more specialized economic structures as their income per capita levels grow. The movement towards major diversification of employment structures would be positive as it means lower exposition to risk and better exploitation of comparative advantage. On the other hand, major specialization, especially if occurs at low stages of development, means less insurance against idiosyncratic shocks. In case of NMS, excessive concentration of employment in few sectors, matched with still ongoing structural change and the risk of unemployment concerning people engaged in contracting sectors, can be principally dangerous.

The rest of the paper is structured as follows: the next section presents briefly the data we use and the relevant methodology. After that, in Section 3 we pass towards empirical estimation of non-linear employment specialization curves in the EU. Finally, the last fourth section concludes.

2. Data and methodology

2.1. Employment specialization measures

Economic specialization is a wide concept thus we focus on one of its aspects, concerning employment structures.[2] In order to assess the degree of specialization we calculate a set of synthetic measures of employment dis-

[2] Alternative measures of specialization could be calculated with the data on production, value added or exports.

persion across sectors based on standard indices of inequality (Cowell, 1995) and used in the specialization literature. As we are interested in measuring the magnitude of employment diversification within each country and not its relative position *vis-à-vis* other countries, we use three absolute measures of overall specialisation.[3]

Let's consider n industries (sectors) present in m countries and denote as E_{ij} the employment in industry $i = 1, 2, \ldots, n$ in country $j = 1, 2, \ldots, m$. Consequently $\overline{E}_j = \left(\sum_i^n E_{ij}\right)\Big/ n$, denotes mean employment per sector in country j.

The indexes of specialization we use (Gini index, coefficient of variation and Theil entrophy index) are synthetically presented in Table 1. Their major values are associated with higher degree of specialisation (thus lower diversification).

Table 1.

Adopted absolute specialization measures

Specialization index	Formula	Lower and upper limit
Absolute Gini index	$AbsGini_j = \left(\frac{2}{n^2 \overline{E}_j}\right)\sum_{i=1}^{n}\left[\left(i - \frac{n+1}{2}\right)E_{ij}\right]$	$AbsGini_j \in \langle 0,1 \rangle$
Coefficient of variation	$CV_j = \left[\sqrt{\left(\frac{1}{n}\sum_{i=1}^{n}\left(E_{ij} - \overline{E}_j\right)^2\right)}\right]\Big/ \overline{E}_j$	$CV_j \in \langle 0, \infty \rangle$
Absolute Theil entrophy index	$AbsTheil_j = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{E_{ij}}{\overline{E}_j} \cdot \ln \frac{E_{ij}}{\overline{E}_j}\right)$	$AbsTheil_j \in \langle 0, \ln(n) \rangle$

Note: i refers to sector and j to country
Source: Parteka (2009).

2.2. The data

In order to calculate the aforementioned specialisation measures we use detailed statistics for 25 EU countries and 71 industries grouped into 17 main sectors[4] classified according to the European NACE Rev.1 system of disaggregation and coming from EU KLEMS database. The data is available through the years 1970–2004 for EU15 countries[5] and 1995–2004 for NMS. Sec-

[3] Absolute measures (such as Herfindahl index, coefficient of variation, absolute Gini index or absolute Theil entrophy measure) give an information on the degree of dispersion of a variable of interest (in our case—employment) in a given country while relative measures (like relative versions of Theil and Gini index or dissimilarity index) refer internal structure of a country to the overall typical structure in the whole sample, indicating how different is the structure of a country with respect to the typical trend in the whole sample of countries. For a discussion of differences in the results obtained with absolute and relative measures of specialisation see Parteka (2009).

[4] All economy wide activities, including agriculture, manufacturing, services etc. (list available on request). Detailed list of all NACE Rev.1 sectors is available at www.euklems.net.

[5] Apart from Germany and Ireland for which complete data is available for the years 1991–2004 and 1995–2004, respectively.

toral employment statistics we use permit us to check if we obtain analogical specialization patterns looking not only at manufacturing sectors but also at all economy—including agriculture, services and construction industries.

In the course of analysis we use additional country specific variables: GDP per capita levels (in US$, 2000), GDP (in US$, 2000), population size and the degree of openness (exports plus imports as % of GDP) come from Penn World Table 6.2. Human capital proxy (education enrolment at secondary level as % of total population 15–65) is calculated with the data on secondary enrolment (number of persons enrolled in education at 2^{rd} ISCED level) from UNESCO and demographical data from Eurostat. So calculated HC proxy is available only for the years 1980–2003 while all other statistics are obtainable for the whole period 1970–2004.

2.3. Nonparametric and semiparametric methodology

Our main interest lies in linking evolution of specialisation patterns in Europe, with the development paths of European countries. The relationship between sectoral specialization ($SPEC_{jt}$) and output per capita ($GDPpc_{jt}$)—where j refers to country and t to time—does not necessarily have to be linear and monotonically stable. In fact, there is some empirical assessment confirming that economies may undergo different stages of specialization as their income per capita grows (Imbs and Wacziarg, 2003; Koren and Tenreyro, 2007). Hence, instead of imposing a linear trend of the form:

$$SPEC_{jt} = \alpha + \beta\left(GDPpc_{jt}\right) + u_{jt} \tag{1}$$

and estimating the coefficients with standard linear regression methods, we rather turn to nonparametric and semiparametric methods. As we expect some kind of a nonlinear relationship between specialization and GDP per capita, the idea is to impose as little structure on the relationship between the two variables of interest as possible, not making implicit assumptions about the parametric form of the function to be fitted to the data.

As a first approximation we use locally-weighted smoother (also known as lowess) as suggested by Cleveland (1979), which permits us to plot the following relationship:

$$SPEC_{jt} = s\left(GDPpc_{jt}\right) \tag{2}$$

where $s(.)$ is an arbitrary unspecified function. A smoother is a nonparametric tool used for estimating the trend while the estimate of $s(.)$ produced by the smoother is known as smooth. Lets represent a sequence of n observed values of X as $x = (x_1, x_2, \ldots, x_n)^T$ and those of Y as $y = (y_1, y_2, \ldots, y_n)^T$. In our case Y is one of a synthetic employment specialization measures calculated previously while X is GDP per capita level. At first, we use scatterplot smoother (which is a smoother for a single predictor). For every point $x_{0,}$ smooth $s(x_0)$

uses k nearest neighbours (closest points to x_o) denoted by $N(x_0)$ which are identified at the beginning by the smoothing parameter (span) which is the number of nearest neighbours, usually expressed as a percentage of the data points. We define span by cross validation procedure in order to minimise the effects of typical for lowess trade off between bias and variation. Decreasing weights w_i are given to each point in $N(x_0)$ (usually through the tri-cube weight function)—such weighting scheme provides decreasing weights (and less relative importance) on observations which are more distant from x_0. Finally, $s(x_0)$ is a fitted value at x_0 coming from the weighted least squares fit of Y to X confined to $N(x_0)$. The procedure is repeated for each observation (thus the number of regressions is equal to the number of observations)[6] and the fitted values are used for the construction of the nonparametric curve representing the relationship between Y and X (in our case—specialization and GDP per capita level, respectively). The result is a nonparametric curve showing the relationship between the two variables of interest.[7]

As lowess smoother does not take into consideration any other possible determinants of specialization, apart from the development level, in the next step we apply semiparametric estimation in form of a Generalised Additive Model (GAM). Additive models (Hastie and Tibshirani, 1990) extend the usual structure of a linear regression and allow some (or all) components of a model to take on nonparametric forms—in particular, GAM specification permits us to apply a mixture of linear and nonlinear elements. In other words, instead of estimating a linear model of the form:

$$SPEC_{jt} = \beta GDPpc_{jt} + \sum_{p=1}^{q} \delta_p \mathbf{X}_{pjt} + u_{jt} \tag{3}$$

where as previously j refers to country, t to time, $\mathbf{X}_{pjt}$ denotes a vector of $p = 1, \dots, q$ additional control variables and all the coefficients β and δ_p are obtained with standard linear estimation techniques such as OLS or similar, we apply the following GAM specification:

$$SPEC_{jt} = s\left(GDPpc_{jt}\right) + \sum_{p=1}^{q} \delta_p \mathrm{X}_{pjt} + u_{jt} \tag{4}$$

where $s(.)$ is an unrestricted function estimated from the data through a back-fitting procedure (for details see Hastie and Tibshirani, 1990: 90–91) and coefficients δ_p associated with additional control variables, which enter into the equation linearly, are obtained with GLS estimation techniques.[8] Whereas linear models like (3) assume that the response is linear in each predictor, additive models allow that the response is affected by predictors

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[6] In practice, available software implementations (such as SPlus which we use here) often compute the fit over a limited set of x values and use interpolation elsewhere.

[7] For details concerning the whole procedure see Hastie and Tibshirani (1990) from which also comes the notation in this paragraph.

[8] All calculations will be done with SPlus.

in a smooth way; in particular any combination of non linear and linear predictors can be adopted and in our specification we assume that selected predictor—GDP per capita level—enters into a model in a smooth way while other predictors can enter into the model linearly. Graphical representation of nonlinear effect can be shown by the plot of partial residuals, which conveniently illustrates the relationship between dependant variable (*SPEC*) and non-parametric component (*GDPpc*) after having controlled for the importance of other components of the additive model.

In the next section we present the results regarding the evolution of employment specialisation in the EU countries obtained with the methodology described above.

3. Evolution of employment specialisation along the development path of the EU countries

3.1 The evolution of employment specialization in separate EU countries through time

Lets look at the Table 2 where we report the results of the regression of specialization (multiplied by 100 and in natural logs) on the time trend (as in Amiti, 1999). We present the percentage rate of growth of employment specialization, which can give us a general indication on the evolution of this phenomenon during the course of European integration.

Table 2.

Employment specialization trends in the EU countries

Percentage rate of growth of employment specialization #			
EU15 t = {1970, ..., 2004}		NMS t = {1995, ..., 2004}	
AUT	–0.2 (–1.63)	CZE	–0.04 (–0.16)
BEL	<u>1.2*</u> (46.11)	EST	<u>0.7**</u> (2.30)
DNK	<u>0.9*</u> (28.23)	HUN	–0.1 (–0.56)
ESP	<u>–0.4*</u> (–3.91)	LTU	–0.2 (–0.65)
FIN	<u>0.3**</u> (2.46)	LVA	–0.6 (–1.43)
FRA	<u>0.9*</u> (17.93)	POL	<u>1.0*</u> (8.13)
GBR	<u>1.7*</u> (57.98)	SVK	<u>0.8*</u> (4.43)
GER[1)]	<u>1.0*</u> (13.09)	SVN	–0.02 (–0.16)
GRC	<u>–1.0*</u> (–10.73)	MLT	<u>1.8**</u> (2.36)
IRL[2)]	<u>1.4*</u> (4.38)	CYP	0.4 (1.33)
ITA	<u>–0.6*</u> (–4.29)		
LUX	<u>1.6*</u> (8.57)		
NLD	<u>1.0*</u> (35.24)		

Percentage rate of growth of employment specialization #			
EU15 t = {1970, ..., 2004}		NMS t = {1995, ..., 2004}	
PRT	–0.9* (–10.28)		
SWE	0.9* (21.51)		

Note: # 100β coefficient estimate from OLS regressions of natural log of employment specialization measure (*Theil_all*) on time trend performed separately for each country: $\ln(SPEC)_t = \alpha + \beta t + \varepsilon_t$; Heteroschedasticity consistent standard errors. t-statistics in parenthesis. * statistically significant at 1% level, ** statistically significant at 5% level, statistically significant rates of growth are underlined.
1) 1991–2004; 2) 1995–2004.
Source: own calculations.

It emerges is that among EU15 countries between 1970 and 2004 employment specialization has increased in ten of them. Among statistically significant results, the highest positive annual rates of growth of employment specialization have been registered in Great Britain, Luxembourg and Ireland (1.7; 1.6 and 1.4 percent, respectively). Overall employment specialization decreased in the remaining five countries (namely: Austria, Spain, Greece, Italy and Portugal—the trend is significant in all of them except Austria). Hence, taking into account only statistically significant results, we can conclude that roughly speaking lower income EU15 countries have decreased their specialization, while the contrary is true for those Member States which were (are) in a group of higher income per capita countries. This evidence is in line with our expectations based on previously described existing empirical evidence showing decreasing specialization at initial stages of economic development. Due to short time span the results regarding NMS are in major part insignificant (the changes have not been linear in one direction). However, in the last 10 years (1995–2004) four of NMS, growing in terms of GDP per capita levels, have shown statistically significant tendency towards increasing specialization: economic structures of Malta, Estonia, Slovakia and Poland have become more concentrated since 1995.

3.2. Nonparametric estimations of specialization—GDP per capita relationship

In this section we link the experience of all EU countries in our sample in order to estimate specialization curves based on pooled data and describing the typical evolution of employment specialization along the European path of growth.[9] Pairwise correlations between various measures are presented in Table 3 and it turns out that they are high as long as we look only at all economy or only at manufacturing but the direct confrontation between manufacturing specialization and that characterising all economy can be less immedi-

[9] Note that we do not focus on the direction of causality but rather on the contemporary evolution of the two phenomena: economic development and the degree of specialization. We thank the Referee for raising this point.

ate. Still, Figure 1 demonstrates that overall nonparametric (lowess) curves obtained with synthetic measures of dispersion in the distribution of economic activity across all industries (left panel) and only within manufacturing (right panel) are very similar.

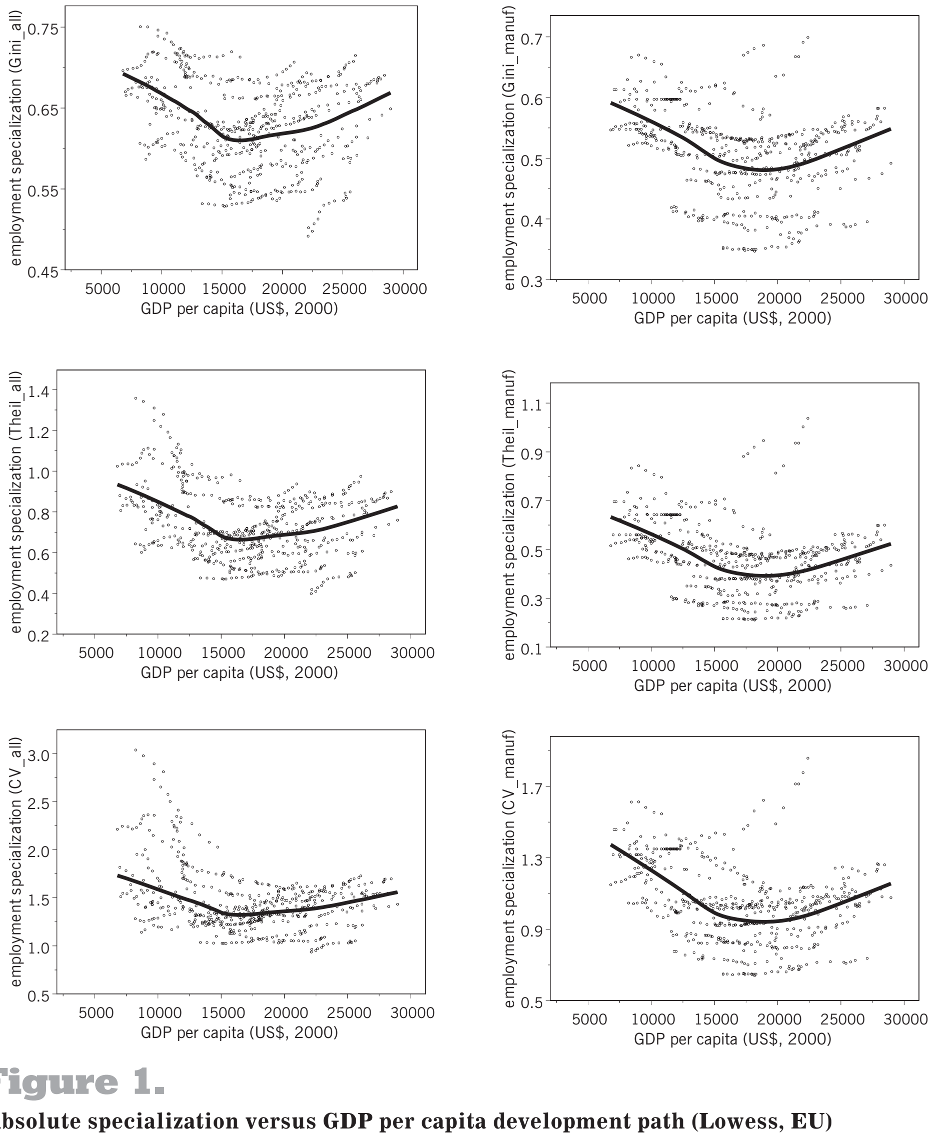

Figure 1.

Absolute specialization versus GDP per capita development path (Lowess, EU)

Note: 548 observations (1970–2004 for EU15 countries and 1995–2004 for NMS–10), EU25 without LUX excluded as outlier, span defined by *Cross Validation*; specialization measures calculated with industrial employment statistics maintaining the same set of sectors for a given country through time (detailed list of sectors for each country available on request); left column—overall economy specialization, right column—manufacturing specialization only.

Source: own elaboration.

Table 3.

Correlations between various absolute measures of employment specialization (EU)

		All economy			Manufacturing only		
		Gini__all	Theil__all	Cv__all	Gini__manuf	Theil__manuf	Cv__manuf
All economy	Gini__all	1.00					
	Theil__all	0.96	1.00				
	Cv__all	0.87	0.95	1.00			
Manuf. only	Gini__manuf	0.62	0.59	0.46	1.00		
	Theil__manuf	0.58	0.57	0.43	0.97	1.00	
	Cv__manuf	0.55	0.55	0.44	0.94	0.97	1.00

Note: absolute measures of specialization calculated with employment data from EU KLEMS industrial database, EU25 (EU15: 1970–2004, Germany 1991–2004 and Ireland 1995–2004 due to data unavailability; NMS–10: 1995–2004), Pearson correlation coefficients in this table are based on 583 observations, all pairwise correlations are significant at 5% level; analogical results have been obtained using Spearman correlation coefficients.

Independently on the specialization measure used (Absolute Gini index, Absolute Theil index and coefficient of variation) we find lowess U curves indicating decreasing absolute specialization at the primary stage of development and the beginning of the opposite trend afterwards. Therefore, the tendency towards more pronounced diversification at the beginning of the development path holds also in the EU.

Turning point occurs rather late (around 16000 US$ in year 2000 constant terms which roughly speaking corresponds to the level of GDP per capita of United Kingdom at the beginning of the 1980s or Slovenia at the end of 1990s). It confirms analogical results obtained in the specialization literature drawing on industrial data—Imbs and Wacziarg (2003) estimate turning point at the level of approximately 16500 US$ while in case of Koren and Tenreyro (2007) study it is lower and equal to about 14000 US$ (both values reported to 2000 constant terms).

However, as we remember lowess estimations do not take into account neither country specific effects nor additional variables of interest, which may influence the evolution of specialization patterns along the process of economic development. In fact, also in the EU case we can observe heterogeneity of country-specific specialization curves, which, however, can be, attributed to the fact that single EU countries are located on opposite sides of the curve. Lower panel of Figure 2 shows some examples of the richer Member States, which tend to be localised on the right (rising) side of the U curve. At the same time the evolution of specialization in those Member States which are (were) characterised by lower levels of GDP per capita has followed the left (falling) side of the curve and in some cases we can observe the turning point (Figure 2 higher panel).

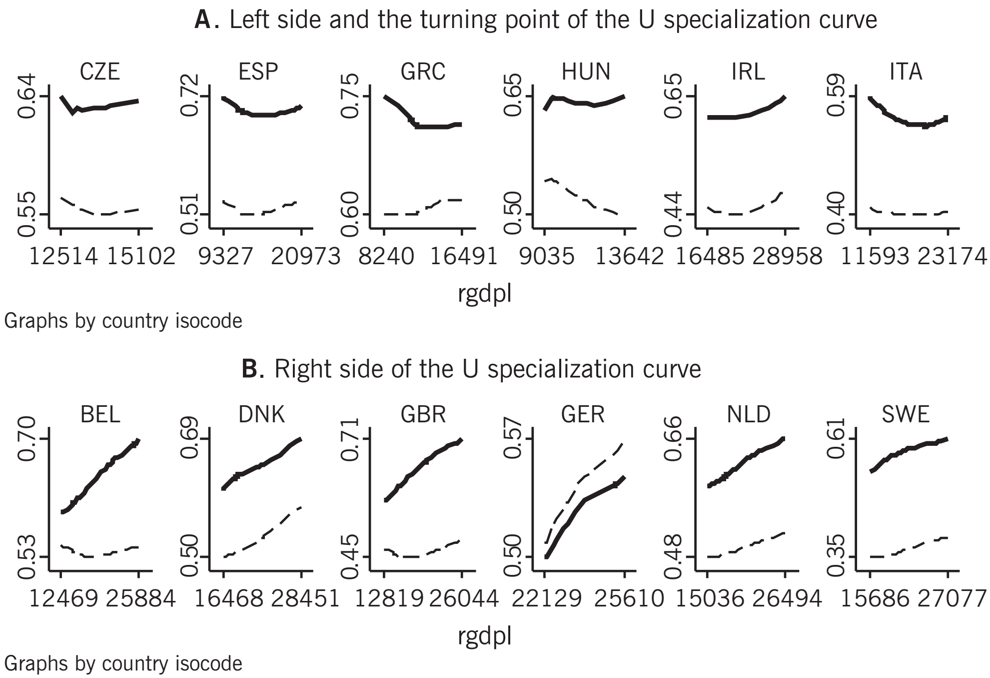

Figure 2.

Country-specific employment specialisation curves: selected EU countries

Note: separate plots show lowess estimations (span = 0.8) of the relationship between overall employment specialization measure (y axis: absolute Gini index) and the level of economic development (x axis) in $ (2000); solid line: all industries, dashed line—manufacturing only.

Source: own elaboration.

In the next section we control the shape of overall specialization curves by the inclusion of country specific characteristics.

3.3. Semi parametric estimations of specialization—GDP per capita relationship

In order to check the shape of specialization curves by the inclusion of other country specific predictors, we turn to semi-parametric GAM (Generalised Additive Models) estimations, which permit us to control employment specialization patterns for possible determinants of specialization that we include as linear effects. We still do not want to impose any structural form on the relationship between the degree of specialization and GDP per capita level therefore the latter variable enters into GAM estimations as non-parametric component. Given high correlations within the groups of indices calculated for the whole economy and manufacturing sectors only (Table 3), we rely on one measure (Absolute Gini index) within each of the groups (*AbsGini_all* and *AbsGini_manuf*).

Table 4.

GAM estimations of specialization curve, EU25

		Dependent variable: employment specialisation, EU25							
		ALL ECONOMY—AbsGini_all				*MANUFACTURING ONLY—AbsGini_manuf*			
		GAM(1a)	GAM(2a)	GAM(3a)	GAM(4a)	GAM(1b)	GAM(2b)	GAM(3b)	GAM(4b)
Non-parametric effect	pcGDP	Fig 3.1a	Fig. 3.2a	Fig. 3.3a	Fig. 3.4a	Fig 3.1b	Fig. 3.2b	Fig. 3.3b	Fig. 3.4b
Linear effect	OPEN	0.018** (2.95)	–0.008 (–1.07)	–0.008 (–1.07)	–0.012 (–1.14)	0.092** (9.85)	0.07** (5.69)	0.07** (5.69)	0.06** (3.66)
	POP		–0.02** (–5.39)		–0.02** (–3.95)		–0.02** (–3.28)		–0.02** (–2.81)
	GDP			–0.02** (–5.38)				–0.02** (–3.29)	
	HC				0.07** (3.13)				0.08*** (2.29)
R^2		0.17	0.21	0.21	0.23	0.29	0.31	0.31	0.39
No. obs		546	546	546	349	546	546	546	349
Non par. Df		2.8	2.8	2.8	3	2.8	2.8	2.8	3
Non par F p(F)		24.75419 2.94e–014	29.18738 1.11e–016	29.1893 1.11e–016	16.748 3.039e–010	18.35965 8.45e–011	20.8552 3.69e–012	20.8552 3.69e–012	18.1061 5.2929e–011

Note: dependent variable—Absolute Gini index calculated with EU KLEMS industrial employment data; explanatory variables: pcGDP = per capita GDP (constant US$, 2000),OPEN = total trade as % of GDP, POP=total population, GDP = total GDP (constant US$, 2000), HC= human capital (% of population of the age 15–65 enrolled in secondary education) all variables in natural logs; constant included not reported; nonparametric span=0.5; t-value in parenthesis;* significant at 1%level, ** significant at 5%level, ***significant at 1% level.

Fig. 3.1a
all economy;
GAM: GDP pc + openness

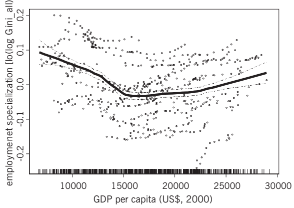

Fig. 3.1b
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GAM: GDP pc + openness

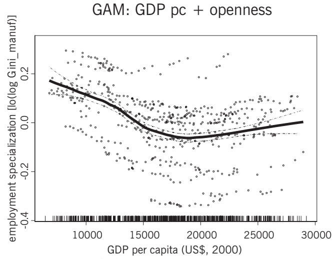

Fig. 3.2a
all economy
GAM: GDP pc + openness + pop

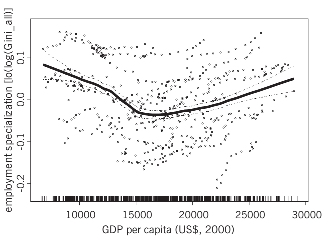

Fig. 3.2b
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GAM: GDP pc + openness + pop

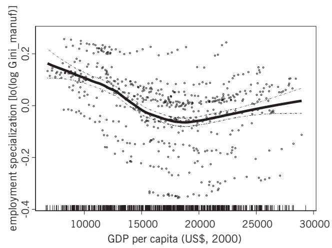

Fig. 3.3a
all economy
GAM: GDP pc + openness + GDP

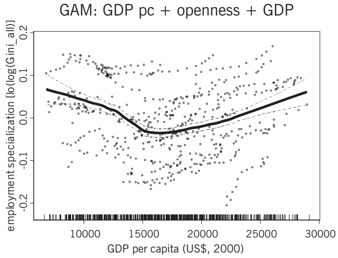

Fig. 3.3b
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GAM: GDP pc + openness + GDP

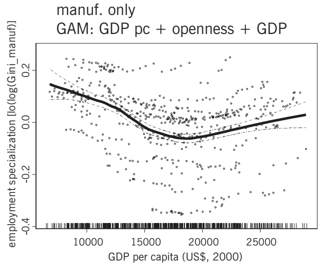

Fig. 3.4a
all economy
GAM: GDP pc + openness + pop + HC

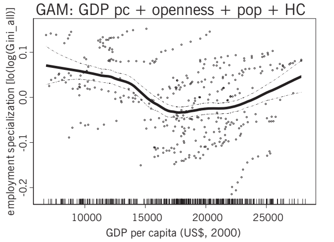

Fig. 3.4b
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GAM: GDP pc + openness + pop + HC

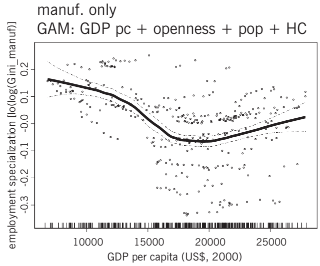

Figure 3.

Specialization versus GDP per capita development path (GAM, EU, 1970–2004)

Note: EU25 without LUX excluded as an outlier; x axis: GDP per capita (constant US$, 2000), 548 observations (1970–2004 for EU15 countries and 1995–2004 for EUNMS–10); *y* axis: partial residuals of specialization measures (Absolute Gini index) calculated with industrial employment statistics maintaining the same set of sectors for a given country through time; all variables introduced as logs, separate graphs correspond to GAM estimations specified in Table 4.

Source: own elaboration.

We suspect that the evolution of specialization along the development path may be influenced by country size (proxied by population and total GDP), the degree of trade openness or the quality of human capital. Country size influences internal market dimension (Krugman, 1991) while the degree of openness acts as market extension (Krugman and Venables, 1990; Haaland, 2002). We expect that larger countries will have more heterogeneous (thus less specialised) economic structures. Higher quality of human capital should facilitate the diversification of production process and penetration of the economy by 'new' activities (Aghion and Howitt, 1998). Note, however, that here we are more interested in the robustness of the shape of nonlinear relationship between the degree of employment specialization and the development levels, rather thaN in the estimations of additional coefficients.

The results are presented in Table 4 along with graphic representations of non-linear component presented in Figure 3.

The inclusion of additional variables as linear components maintains the U shaped pattern of specialization along the development path (Figure 3), with a clear tendency towards despecialization in initial phase of GDP per capita growth and a weak uprising trend afterwards. Non-linear component results to be significant (as demonstrated by values of nonparametric F statistics in Table 3). Therefore, we conclude that the result of decreasing specialization in the initial phase of growth obtained for a sample of world economies (Parteka, 2009) with a documented possibility of a U shaped pattern of industrial specialization (Imbs and Wacziarg, 2003; Koren and Tenreyro, 2007) holds also in case of the EU.

4. Conclusions

The main aim of this paper was to assess empirically the relationship between the degree of specialization of employment structures and the level of development in the enlarged EU. Such a relationship may be important if we consider arguments related to major risk associated with less diversified economic structures.

Our analysis draws on sectoral employment data obtainable from EU KLEMS database for EU15 countries (1970–2004) and ten NMS (1995–2004), which joined the EU in 2004. It turns out that for the years between 1970 and 2004 there is some evidence of decreasing specialization in poorer EU15 members (mainly cohesion countries) while increasing employment specialization trends can be revealed in ten more developed EU15 countries. Roughly speaking lower income EU15 countries have experienced decreasing specialization, while the contrary is true for those Member States, which were (are) in a group of higher income per capita countries. This evidence is in line with international empirical evidence drawing on industrial data and showing decreasing specialization at initial stages of economic development and upward rising trend at higher levels of growth. As for the NMS, between 1995 and 2004 four of them have shown statistically significant tendency towards increasing employment specialization (Malta, Estonia, Slovakia and Poland).

Nonparametric specialization curves, linking unconditionally development levels with the degree of employment specialization, confirm the U shaped pattern. We control for the importance of additional variables indicated by the literature and possibly favouring diversification process: country size, openness and human capital. We adopt semiparametric additive models technique and the main result is robust: within the EU countries there is a clear tendency towards employment despecialization in the initial phase of GDP per capita growth followed by a weak uprising trend afterwards. The turning point occurs rather late (approximately 16000 US$ in const 2000 prices). The results are confirmed both for specialization calculated across all economic sectors and within manufacturing only.

The analysis we presented here should be treated only as a restricted insight to the wide theme of economic specialization. An interesting continuation of the argument could be the analysis of diversification patterns in the Euro area in the light of OCA theory, especially in the perspective of NMS entering the Eurozone.[10]

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[10] We thank the Referee for raising this point.

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Abstract

Employment Specialization in the Enlarged European Union

This paper presents the evolution of absolute employment specialization along the course of economic growth of EU–25 countries. We focus on the degree to which EU economies concentrate labor force in a few sectors/industries. We use disaggregated statistics classified according to NACE Rev. 1 division (71 sectors) and calculate various synthetic indices measuring the degree of diversification typical for the employment structures of EU15 countries (1970–2004) and ten New Member States (1995–2004). Using nonparametric and semiparametric estimation techniques, we estimate the relationship between employment specialization and the development level, controlling for the inclusion of additional determinants of the diversification process. The main findings are in line with the trends revealed in analogical empirical studies using industrial data for international samples of countries: also within the enlarged EU there is a tendency towards decreasing absolute specialization of employment at initial phases of growth matched with an upward rising trend after over passing the GDP per capita level of about 16000 US $ (const 2000).