Empirical investigation on labour market interactions in an enlarged Europe

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Abstract

This paper proposes an empirical assessment of economic interactions between the labour markets of the integrating EU over the period of time 1995–2005. Drawing on recently made available industry statistics, we provide a sector level study (13 tradable sectors, including manufacturing and services), analysing the contemporary evolution of domestic and trade partners' employment levels. Given the intensification of trade relations as a result of ongoing integration process, we build a sector-specific measure of economic interdependency, based on information on labour markets' performance and weighted by the magnitude of intra-EU trade flows (imports). The estimates of a dynamic empirical model confirm the interactions between employment levels in different Member States. Domestic employment in NMS-5 is rather positively affected by the expansion of labour markets in other EU's trade partners (domestic employment levels in NMS-5 countries improve in parallel to the increase in foreign tradable sectors' employment). The opposite holds true for EU-15 domestic labour markets that are rather challenged by the expansion of tradable sectors in their EU trade partners.

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1. Introduction

Ongoing integration and the opening up towards Central and Eastern Europe (CEECs), which took place after the system transformation in early 1990s, have changed significantly the dynamics of the European economy. The countries that eventually joined the EU in recent years (New Member States – NMS: Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovenia and Slovakia joined the EU in 2004; Bulgaria and Romania acceded in 2007) have become more and more integrated into the European economic network, in the first instance based on the intensification of trade relations. In 1990, 46 per cent of exports from the twelve NMS were directed to the EU-15 countries, in 2005 already 61 per cent (data from UN Comtrade). Trade liberalisation boosted outsourcing and outward processing trade (OPT) practises in Europe based on the relative abundance of low-cost labour in CEECs (Baldone et al. 2001). The importance of OPT in CEECs rose considerably throughout the 1990s: between 1988 and 1999, outward processing exports to CEECs increased by about 12 per cent per year while outward processing imports increased by circa 17 per cent per annum (Egger and Egger, 2005). As a result, CEECs exports towards the EU are strongly linked to the fragmentation of production (de Benedictis, Tajoli, 2008). Wage differentials between EU-15 and NMS[1] also caused the intensification of migration, combined with bigger mobility of other factors of production across an enlarged Europe. All of these factors have resulted in the strengthening of economic relations between old and new Member States, possibly leading to major interdependency between their economic structures. International literature has widely analysed the effects of trade liberalisation and major competition from low-income countries on the situation of labour markets in developed countries.[2] In the European context, the empirical literature has mainly concerned advanced countries' labour markets and has especially considered the effect of imported intermediate inputs on the structure and/or the level of the demand for labour in EU-15 countries (e.g. Egger, Egger 2003; Helg, Tajoli 2005; Geishecker 2006). In this paper, we propose a broader view on the implications of trade integration on labour markets' performance in an enlarged Europe, encompassing into our analysis all EU countries for which the data are available and going beyond the manufacturing sector. Drawing on recently made available industry level statistics, we provide a sector level study (13 sectors), analysing the contemporary evolution of domestic and trade partners' employment levels through the period of time between 1995 and 2005.

The key idea is that if the technology of production is fragmented across EU countries, employment levels and structures also depend on the level and composition of the labour force of the trading partners. The scope of the research is twofold: first of all, to reveal if labour markets' performance in NMS and EU-15 countries are interrelated and, secondly, if there are substitution or complementarity relations between their employment structures. The answer to such questions may have important implications in the context of political worries on the increasing competition between people employed in various EU member states and possible dangers that low wage conditions in NMS can pose to EU-15 workers. From the point of view of New Member States' labour markets, where job creation still remains rather low despite good growth performance (Landesmann and Vidovic 2006), the stimulus that stronger trade relations with the EU-15 economies can give is of crucial importance.

[1] For example, in 2006 the average hourly compensation of production workers in manufacturing in Poland amounted to USD 4.99, compared to USD 27.10 in the UK and USD 34.21 in Germany (data from U.S. Department of Labor, Bureau of Labor Statistics, January 2008).

[2] For a review of existing evidence on trade and employment interactions, see Hoeckam and Winters (2005) or Feenstra and Hanson (2004) for the survey on trade and wages.

The rest of the paper is organised as follows. In Section 2, following the introduction, we review the theory and the empirical literature on the labour market effects of increased integration. Then, in Section 3 we describe the data and present some descriptive statistics on tradable sectors' performance in EU-15 and NMS over the period 1995–2005, focusing on trade relations and labour market performance in the two groups of countries. In Section 4, we pass towards the assessment of the effects of trade transmission mechanisms, reflected in the changes on the EU-15 and NMS-5 labour markets. We build a sector-specific measure of economic interdependence between the two groups of countries, based on the average labour endowment of their trade partners. Subsequently, we estimate an empirical model aimed at revealing the link between domestic and foreign employment levels in the enlarged EU context. Finally, the last fifth section concludes.

2. Theoretical and empirical background

The interactions between domestic and foreign employment (in general and divided by types of labour differentiated according to skill or educational levels) have been mainly analysed in terms of substitution – complementarity relations and the effects of integration on wages. The literature on the effects of globalisation (Feenstra 1998; Feenstra, Hanson 2004; Krugman 2008) on the labour markets focused on the increasing wage inequality between skilled and unskilled labour, considering foreign unskilled labour as a substitute for the domestic unskilled labour and a complement for the domestic skilled labour. Recent contributions (Grossman, Rossi-Hansberg 2006a, 2006b) suggest that foreign low-skilled labour need not be a loser from globalisation: the "productivity" effect caused by offshoring practises may actually reward the low-skilled labour due to a certain degree of complementarity which exists among the domestic and foreign tasks using intensively the same type of labour. Consequently, an increase in employment abroad does not necessarily cause a reduction of domestic employment.

The majority of existing empirical literature which deals with economic changes that have taken place within the EU have focused on the intensification of economic relations between East and West. Additionally, the research has been concentrated on the subject of structural change and quality upgrading in CEECs. Due to rather restricted availability of industry data up to the most recent years, these aspects have been analysed mainly from the point of view of trade. While in early 1990s, it was predicted that transition European economies would rather specialise in labour-intensive sectors, evidence for the subsequent decade shows that throughout the 1990s those countries that eventually joined the EU in 2004 managed to gain comparative advantages in high-tech industries (Zaghini 2005). Especially the Czech Republic, Slovakia, Hungary, Poland and Slovenia were successful in substantial quality upgrading (Dulleck et al. 2005). At the same time, the evolution of CEECs' trade pattern converged towards the pattern of the EU-15, leading to major trade similarity (de Benedictis, Tajoli 2007; Crespo, Fontoura 2007) and such similarity in export composition has had a positive impact on the catching-up process in terms of income (de Benedictis, Tajoli 2008).

Surprisingly, there is little empirical evidence on the labour market effects of European integration seen from the broader perspective of trade relations between East and West. The research has focused more on western EU countries (EU-15) and the effects the integration and outsourcing practices towards the East may have had for their employment. Existing evidence is available rather in the form

of country-specific studies. Egger and Egger (2003) argue that the increase in outsourcing to Central and Eastern Europe and the former Soviet Union have considerably shifted relative manufacturing employment in Austria in favour of high-skilled labour while a moderate increase in the skill premium took place. Helg and Tajoli (2005) find that the increase of the skilled-to-unskilled labour ratio in Italy has been caused by international fragmentation of production (IFP), while in Germany IFP appears to have no influence on changes in the relative demand for skilled labour. Geishecker (2006) finds that outsourcing to Central and Eastern Europe reduces the relative demand for unskilled workers in Germany. Falk and Wolfmayr (2008) focus on labour market effects in five EU countries (Austria, Finland, Germany, Italy and the Netherlands), finding that the outsourcing of intermediate materials to low-income countries (CEECs included) has a stronger impact on the demand for labour than the outsourcing of services. The evidence on the impact of trade integration on labour markets in NMS has mainly focused on the evolution of wages in these countries (Egger, Egger 2002; Egger 2006; Egger, Pfaffermayr 2004) and not implications of integration for employment levels. In general, in the literature on European integration issues, so far little emphasis has been put on a parallel assessment of the importance of trade intensification between EU-15 and NMS on employment structures in both groups of countries, which is a basic gap that we intend to fill in.

3. Data and evidence on trade and labour markets' developments in an enlarged EU

3.1. The Data

This paper aims at investigating the interdependence between Central-Eastern and Western Europe labour markets, making use of quite detailed industry level data on the demand for labour in old and new EU members. We are interested in trade-based interaction mechanisms, making endogenous the role of integration into labour market outcomes, thus for the purpose of our study we construct a database composed of employment and trade statistics matched at the sectoral level.

As for the data sources, disaggregated labour market statistics (number of employees and persons engaged in production[3], their labour compensation and time of work) come from EU KLEMS Growth and Productivity Accounts database[4] (release 2008). All nominal variables have been reported into real terms (1995 = 100) using sector-specific value added price indices also from EU KLEMS. Statistics that were reported in national currencies are recalculated into euros using bilateral exchange rates from Eurostat. Trade statistics (volume of bilateral exports and imports within the same sector between NMS and EU-15 members, as well as the volume of total trade with all world partners) are obtained from UN Comtrade database through WITS retrieval system[5] and originally follow NACE division (which is also a basic classification of the industrial statistics we use).

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[3] The difference between the two are the self-employed and family workers. The discrepancy between the number of employees and the number of persons engaged in production may be considerable in the industries with a large proportion of self-employed, like agriculture and retailing.

[4] Available at www.euklems.net. We use the original names of variables – detailed methodological issues regarding the creation and content of EU KLEMS database can be found in Timmer et al. (2007).

[5] World Integrated Trade Solutions (www.wits.worldbank.org).

We recalculate all the data in order to obtain information on trade and labour markets for the same sectors – in the end, we end up with 13 tradable sectors (Table 11 in the Appendix – a major degree of disaggregation is impossible if one wants to have trade and employment data for the same sectors), including services, and the period of time 1995–2005 (longer time span is impossible due to restricted data availability for MMS). We use statistics for all EU-15 countries (data for Belgium and Luxembourg are aggregated together) and five NMS (namely: the Czech Republic, Hungary, Poland, Slovenia and Slovakia – from now on called NMS-5). Unfortunately, detailed industrial statistics are not yet available for the remaining NMS, but we will include them in the general description of trade relations within an enlarged EU. In order to avoid confusion with NMS-5, we denote all countries that joined the EU in 2004 and 2007 as NMS-12. A list of countries along with adopted abbreviations can be found in the Appendix (Table 10).

3.2. Intensification of trade relations in an enlarged EU

Economic integration in Europe has resulted in the intensification of trade relations between Western Europe and countries that eventually joined the EU in 2004 and 2007. The following tables present the first insight into the dynamics and significance of trade flows between NMS-12 or NMS-5 and EU-15 in 13 tradable sectors of our interest. In Table 1, we present the importance of EU-15 countries as a source of imports for NMS-12 and NMS-5 countries, while Table 2 contains figures measuring the importance of imports from NMS-12 and NMS-5 for EU-15 countries. Analogical statistics concerning export flows are included in Table 3 and Table 4.

It is clear that, independently on the sector taken into consideration, trade with EU-15 is much more important for NMS than trade with NMS for the EU-15. A very large proportion of total imports to NMS comes from EU-15 countries while the reverse is not true if we consider imports in the opposite direction. Depending on the sector, in 2005 imports from EU-15 accounted for 46.9 per cent to 72.2 per cent (the maximum was reached in the Rubber and plastic products sector) of total world imports reported by NMS-12 countries (upper panel of Table 1); while as much as 47.7 per cent to 75.3 per cent (the maximum was reached in the Renting of machinery and equipment – other business services sector) of total world imports reported by NMS-5 came from the EU-15 (lower panel of Table 1). However, between 1995 and 2005 the share of import flows from EU-15 countries as a percentage of total imports reported by NMS-12 and NMS-5 diminished in most sectors. In the case of NMS-12, the importance of imports from EU-15 rose considerably only in the following sectors: Chemicals and chemical products, Basic metals and fabricated metal products and Renting of machinery and equipment – other business services; in the case of NMS-5, also in Wood and products of wood and cork sector.

On the other hand, if we consider the importance of NMS as partners for EU-15, it turns out that the shares of import flows from NMS-12 and NMS-5 as a percentage of total imports reported by EU-15 (Table 2) are quite low (in 2005, up to 14.1 per cent and 8.1 per cent of total imports directed to EU-15, respectively), but since 1995 NMS-12 and NMS-5 as importers have gained importance in the overall EU-15 structure of imports in most sectors. The most dramatic increase can be observed in rather advanced sectors like Electrical and optical equipment, as well as Transport equipment – in the case of these sectors, the share of import flows from NMS-12 and NMS-5 as a percentage of total EU-15 imports more than doubled between 1995 and 2005. It is worth noticing that imports from

Table 1
Share of import flows from EU-15 countries to NMS-12 and NMS-5 as a percentage of total imports to NMS-12 and NMS-5 (by sector)

	Imports from EU-15 to NMS-12 (% total NMS-12 world imports)												
	A	B	C	D	E	F	G	H	I	J	K	L	M
1995	53.7	74.9	54.1	71.3	61.0	73.7	69.1	58.4	78.5	63.9	71.7	68.6	67.2
2005	54.0	64.3	46.9	68.4	66.6	72.2	58.0	62.0	71.8	49.0	69.7	53.2	71.3
Δ1995– 2005 (%)	0.5	-14.2	-13.4	-4.0	9.2	-2.0	-16.0	6.2	-8.5	-23.3	-2.9	-22.5	6.2
	Imports from EU-15 to NMS-5 (% total NMS-5 world imports)												
	A	B	C	D	E	F	G	H	I	J	K	L	M
1995	57.3	72.7	50.6	72.0	62.6	75.6	69.2	59.2	79.9	63.7	76.2	67.9	66.2
2005	56.2	58.9	52.8	70.6	68.6	75.0	62.1	64.5	72.7	47.7	71.1	52.4	75.3
Δ1995– 2005 (%)	-2.0	-18.9	4.3	-2.0	9.6	-0.8	-10.3	9.0	-9.0	-25.1	-6.7	-22.8	13.7

Note: A. Food, beverages and tobacco; B. Textiles, leather and footwear; C. Wood and products of wood and cork; D. Pulp, paper, printing and publishing; E. Chemicals and chemical products; F. Rubber and plastic products; G. Other non-metallic mineral products; H. Basic metals and fabricated metal products; I. Machinery, nec; J. Electrical and optical equipment; K. Transport eq.; L. Manufacturing, nec; recycling; M. Renting of m&eq – other business services.
NMS-5: CZE, HUN, POL, SVK, SVN.
NMS-12: BGR, CYP, CZE, EST, HUN, LTU, LVA, MLT, POL, ROM, SVK, SVN.

Source: Elaboration with UN Comtrade data.

Table 2
Share of import flows from NMS-12 and NMS-5 countries to EU-15 as a percentage of total imports to EU-15 (by sector)

	Imports from NMS-12 to EU-15 (% total EU-15 world imports)												
	A	B	C	D	E	F	G	H	I	J	K	L	M
1995	1.8	7.6	11.2	1.9	1.9	2.5	7.0	5.7	2.6	2.0	2.3	6.6	0.7
2005	3.4	8.5	14.1	4.6	1.8	7.3	7.3	6.6	6.7	6.9	7.2	10.4	2.3
Δ1995– 2005 (%)	94.1	12.5	26.3	138.5	-6.9	186.6	4.6	15.0	154.9	249.5	216.9	56.8	241.2
	Imports from NMS-5 to EU-15 (% total EU-15 world imports)												
	A	B	C	D	E	F	G	H	I	J	K	L	M
1995	1.4	5.2	8.6	1.8	1.5	2.3	6.0	4.4	2.4	1.6	2.1	5.3	0.6
2005	2.9	3.5	7.7	4.2	1.4	6.4	6.3	5.4	6.0	6.0	6.8	8.1	2.1
Δ1995– 2005 (%)	102.9	-32.2	-10.5	141.6	-3.3	177.3	5.2	22.2	150.8	281.8	218.0	51.7	228.9

Note: A. Food, beverages and tobacco; B. Textiles, leather and footwear; C. Wood and products of wood and cork; D. Pulp, paper, printing and publishing; E. Chemicals and chemical products; F. Rubber and plastic products; G. Other non-metallic mineral products; H. Basic metals and fabricated metal products; I. Machinery, nec; J. Electrical and optical equipment; K. Transport eq.; L. Manufacturing, nec; recycling; M. Renting of m&eq – other business services.
NMS-5: CZE, HUN, POL, SVK, SVN.
NMS-12: BGR, CYP, CZE, EST, HUN, LTU, LVA, MLT, POL, ROM, SVK, SVN.

Source: Elaboration with UN Comtrade data.

NMS-5 represent for Western European partners the bulk of imports coming from NMS. Note, that between 1995 and 2005 the share of imports within Textiles, leather and footwear and Wood and products of wood and cork sectors, coming to EU-15 from NMS-5 in total EU-15 imports, diminished, but the share of NMS-12 as a source of imports of these products has risen, which may be a sign of trade reorientation in these sectors.

A similar pattern is confirmed in export trends. As it can be seen in Table 3, the predominant share of NMS exports is directed to the EU-15: for example in 2005, up to 78.7 per cent of total exports from NMS-12 Textiles, leather and footwear sector and 72.6 per cent of NMS-5 Transport equipment exports were sent to the EU-15 market. In comparison (Table 4), in 2005 the great majority of EU-15 exports was still directed to non-NMS markets; among all tradable sectors taken into consideration only in two cases (Textiles, leather and footwear and Rubber and plastic products) exports with NMS-12 approached 10 per cent of EU-15 total exports in these sectors, in all the remaining ones the importance of NMS-12 as partners was much lower. In 2005, NMS-5 countries were the receivers of the maximum of 8.1 per cent of EU-15 total sectoral export value (Rubber and plastic products).

The importance of EU-15 as receiving markets for NMS-12 and NMS-5 exports (Table 3) has risen in those sectors in which NMS are believed to have enforced competitiveness (Food, beverages, tobacco; Rubber and plastic products; Machinery; Electrical and optical equipment or Transport equipment), diminishing in the remaining ones. The magnitude of changes concerning the importance of NMS-5 and NMS-12 markets as the direction of EU-15 exports in the overall EU-15 export structure was much bigger and increased considerably in all sectors but Renting of machinery and equipment – other business activities (Table 4).

Table 3
Share of export flows from NMS-12 and NMS-5 to EU-15 countries in each sector (as a percentage of total exports from NMS-12 and NMS-5)

	Exports from NMS-12 to EU-15 (% total NMS-12 world exports)												
	A	B	C	D	E	F	G	H	I	J	K	L	M
1995	37.5	80.1	78.1	51.3	44.1	53.9	61.6	62.5	55.5	68.6	60.7	75	42.9
2005	46.4	78.7	65	50.5	38.4	58.7	47.2	59.8	64.7	70.8	70.5	75	59.2
Δ1995–2005 (%)	23.7	-1.7	-16.8	-1.6	-12.9	8.9	-23.4	-4.3	16.6	3.2	16.1	0.0	38.0
	Exports from NMS-5 to EU-15 (% total NMS-5 world exports)												
	A	B	C	D	E	F	G	H	I	J	K	L	M
1995	41.8	79.9	82.5	51.3	46.9	54.2	63.5	64	58.4	69.9	64.8	75.6	44.0
2005	48.6	72.5	66.2	52.3	40.6	59.6	47.5	62.7	66.3	71.5	72.6	75	62.4
Δ1995–2005 (%)	16.3	-9.3	-19.8	-1.5	-13.4	10.0	-25.2	-2.0	13.5	2.3	12.0	-0.8	41.8

Note: A. Food, beverages and tobacco; B. Textiles, leather and footwear; C. Wood and products of wood and cork; D. Pulp, paper, printing and publishing; E. Chemicals and chemical products; F. Rubber and plastic products; G. Other non-metallic mineral products; H. Basic metals and fabricated metal products; I. Machinery, nec; J. Electrical and optical equipment; K. Transport eq.; L. Manufacturing, nec; recycling; M. Renting of m&eq – other business services.
NMS-5: CZE, HUN, POL, SVK, SVN.
NMS-12: BGR, CYP, CZE, EST, HUN, LTU, LVA, MLT, POL, ROM, SVK, SVN.

Source: Elaboration with UN Comtrade data.

Table 4
Share of export flows from EU-15 to NMS-12 and NMS-5 countries in each sector (as a percentage of total exports from EU-15)

	Exports from EU-15 to NMS-12 (% total EU-15 world exports)												
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**
1995	2.9	6.7	2.8	3.7	3.3	4.9	3.9	3.3	4.6	3.7	2.9	3.3	3.1
2005	4.2	9.8	5.6	6.2	4.6	10.1	6.8	7.6	7.3	7.4	5.8	5	2.9
Δ1995–2005 (%)	44.8	46.3	100.0	67.6	39.4	106.1	74.4	130.3	58.7	100.0	100.0	51.5	-6.5
	Exports from EU-15 to NMS-5 (% total EU-15 world exports)												
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**
1995	1.9	4.7	2.1	3.1	2.7	4.1	3.1	2.8	3.7	2.9	2.3	2.4	2.3
2005	3.0	5.4	4.3	5.0	3.7	8.1	5.1	6.3	5.6	5.9	4.6	3.6	2.2
Δ1995–2005 (%)	57.1	15.3	108.1	65.1	37.9	98.3	65.6	124.6	50.4	104.9	99.2	48.1	-4.2

Note: A. Food, beverages and tobacco; B. Textiles, leather and footwear; C. Wood and products of wood and cork; D. Pulp, paper, printing and publishing; E. Chemicals and chemical products; F. Rubber and plastic products; G. Other non-metallic mineral products; H. Basic metals and fabricated metal products; I. Machinery, nec; J. Electrical and optical equipment; K. Transport eq.; L. Manufacturing, nec; recycling; M. Renting of m&eq – other business services.
NMS-5: CZE, HUN, POL, SVK, SVN.
NMS-12: BGR, CYP, CZE, EST, HUN, LTU, LVA, MLT, POL, ROM, SVK, SVN.

Source: Elaboration with UN Comtrade data.

3.3. Labour market performance in EU-15 and NMS-5 countries

Having seen the major characteristics concerning trade patterns within an enlarged EU, we now turn towards a description of the sectoral patterns of employment in EU-15 and NMS-5 countries (complete labour statistics for the remaining NMS are unavailable). As far as overall tradable economy size is concerned (Table 5), between 1995 and 2005, employment in all sectors which we take into consideration on average grew in EU-15 by 12.6 per cent in terms of employees and by 13.6 per cent in terms of persons engaged in production, while in NMS-5 the average change in the number of persons engaged in production over the whole period has been rather modest (1.8 per cent) and the number of employees even decreased by 0.6 per cent.

Information on sector-specific skill content (share of hours worked by high-skill, medium-skill and low-skill persons engaged in production in each sector)[6] permits us to trace the dynamics of the employment skill structure in old and new Member States. In Table 6, we present weighted averages of the share of time worked by the three categories of workers (persons engaged in production – analogical information for employees is unavailable) in each of the EU-15 countries and NMS-5 (such data are unavailable for the remaining NMS) in 1995 and in 2005.

On average, in NMS-5 in 1995, 10.2 per cent of hours worked were performed by high-skill workers and 13.1 per cent by low-skill persons engaged in production, in 2005 the corresponding shares amounted to 16.5 per cent and 9.7 per cent, respectively, which is a sign of the overall skill upgrading

[6] Here, skills are defined on the basis of educational level.

Table 5
Total employment in tradable sectors (by country, 1995–2005)

	Number of employees		Number of persons engaged in production	
	mean (in 1000)*	Δ (%)**	mean (in 1000)*	Δ (%)**
AUT	863.0	9.1	981.3	17.6
BLX	1004.0	10.0	1248.5	14.0
DNK	643.4	2.5	679.1	2.8
ESP	3590.3	40.1	3976.6	39.3
FIN	556.1	21.6	606.8	20.8
FRA	6251.1	11.0	6606.1	10.4
GER	10972.1	5.7	11849.4	8.2
GRC	502.3	6.1	815.9	5.4
IRL	357.0	29.6	398.7	28.1
ITA	5495.8	15.3	7222.1	16.7
NLD	2036.5	14.0	2219.2	13.4
PRT	1151.5	0.6	1252.4	0.3
SWE	1118.3	8.7	1170.0	9.4
UK	6896.5	2.5	7775.3	4.4
Total EU-15	41437.7		46801.2	
Average EU-15	2959.8	12.6	3342.9	13.6
CZE	1512.6	-1.4	1770.8	4.4
HUN	950.8	22.3	1085.6	17.1
POL	3037.6	-7.1	3381.9	-5.6
SVK	694.6	-8.3	653.4	0.4
SVN	298.9	-8.7	321.1	-7.3
Total NMS-5	6494.5		7212.7	
Average NMS-5	1298.9	-0.6	1442.6	1.8

Notes:
* Average values of the number of employees or persons engaged in production (respectively) in a given country throughout the whole period in 13 tradable sectors taken into consideration.
** Overall percentage change in the total number of employees or persons engaged in production (respectively) in a given country in 13 tradable sectors taken into consideration between 1995 and 2005.

Source: Elaboration with data from EU KLEMS.

of employment structures in the NMS-5. The movement towards bigger share of high-skill labour is also observable in the case of EU-15 employment structures.

If we compare individual countries, it turns out that some of the NMS-5 already use labour force with tertiary education (denoted in EU KLEMS as "high skill") more intensively than several EU-15 countries. In 2005, the share of time worked by workers with higher education levels was bigger in Slovenia (19 per cent of total hours worked) or Poland (18 per cent) than in Germany (surprisingly only 10.4), Denmark (11 per cent) or Portugal (11.7 per cent) that had also the highest share of hours worked by low-skill (thus, low-educated in the light of the adopted definition of skills) workers in the whole sample of countries.[7] It confirms the view that NMS are characterised by the human capital of rather high quality, which should enable a successful catching-up process (Caselli, Tenreyro 2005).

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[7] Note that this does not mean that these persons effectively perform high skill tasks. It is plausible that in several NMS persons with higher education degree perform jobs which in EU-15 countries are performed by labour force with only secondary education completed (thus, those classified as medium skilled in EU KLEMS).

Table 6
Country-specific skill content of employment structure (share of hours worked by high-skill, medium-skill and low-skill persons engaged in production)

	H_h		H_m		H_l	
	1995	2005	1995	2005	1995	2005
AUT	8.5	14.9	66.7	66.2	24.8	18.9
BLX	14.1	18.4	37.8	48.79	48.1	32.8
DNK	6.3	11	57.1	60.3	36.6	28.7
ESP	13.3	22.2	24.8	33.57	61.9	44.3
FIN	28.3	33.3	42.6	46.5	29.1	20.2
FRA	13.6	20.3	59.1	61.47	27.3	18.2
GER	8.7	10.4	60.4	59.51	30.8	30.1
GRC	20	28.2	33.1	42.42	46.9	29.4
IRL	12.7	24.3	75.6	67.02	11.7	8.7
ITA	7.8	19.2	90.8	80.25	1.4	0.6
NLD	9.7	17.7	80.4	76.45	9.9	5.9
PRT	7.6	11.7	11.7	14.49	80.7	73.8
SWE	11.6	20.9	61	62.61	27.4	16.5
UK	15.8	24.3	64.6	63.65	19.6	12.1
Average EU-15	11.5	18.1	61.3	60.5	27.2	21.3
CZE	11	13.6	77.7	78.8	11.3	7.6
HUN	11.2	17.2	66.2	64.5	22.6	18.3
POL	9.3	18	79.8	74	10.9	8.1
SVK	10.4	15.3	80.1	79.8	9.5	4.8
SVN	12.1	19	62.6	62.5	25.4	18.5
Average NMS-5	10.2	16.5	76.7	73.7	13.1	9.7

Notes:
H_h: share of hours worked by high-skill persons engaged in production;
H_m: share of hours worked by medium-skill persons engaged in production;
H_l: share of hours worked by low-skill persons engaged in production. Weighted averages over skill content of 13 tradable sectors taken into consideration. Weights represented by the share of hours worked in each sector in total hours worked in the sectors taken into account. EU-15 and NMS averages are weighted by the share of employment of each country within the corresponding group.
* Information on the share of hours worked by different categories of employees is unavailable.

Source: Elaboration with data from EU KLEMS.

4. Labour market interdependency

4.1. Changes in employment in tradable sectors "at home" and in partner countries

The core of our analysis is the focus on possible interdependencies between labour markets in old and new Member States emerging from the integration process. We aim to do it by exploring the relations between the contemporary evolution of employment structures "at home" and in partner countries. We assume that the more countries are integrated with each other, the major interdependency exists

between their economic structures, labour markets in particular. For this purpose, for each country and sector we build a variable *EMP_part* that measures weighted average employment in the same sector in partner countries:

$$EMP\_part_{ijt} = \frac{\sum\limits_{q=1}^{R} imports_{iqjt} * Employment_{qjt}}{\sum\limits_{q=1}^{R} imports_{iqjt}}$$ (1)

where for country *i*'s sector *j* at time *t*, employment in partner country *q* (for $q = 1,..., R$)) is weighted using country *i*'s imports from partner *q*, for $q = 1,..., R$), in the same sector. Such weighting scheme allows us to consider endogenous trade-based interactions between labour markets "at home" and abroad. Due to the evidence on the importance of outward processing trade, we use imports within the same sector, and not exports, as weights of trade interdependency. The definition of partner countries adopted here refers to partners in the EU in our sample including both old and new member partners, thus while building (1) in our case for each country *i* we consider its 19 partners. We will consider *EMP_part* calculated for the whole sample of countries (thus for *i* = 1,..., 20), as well as for the two subgroups of interest: EU-15 (denoted as old), thus for *i* = 1,..., 15, and NMS-5 (denoted as new), thus for *i* = 16,..., 20.

The main question is whether there is substitution or complementarity between domestic and foreign employment, in other words whether the rise in the size of employment in trade partners (*EMP_part*) provokes the reduction or expansion of employment in the same tradable sector "at home". Table 7 shows synthetic statistics on the change in tradable employment (in terms of persons engaged in production, divided by sector) "at home" and in partner countries. The weighted averages of changes referring to the EU-15 group's home employment and its partners are included in the second and third column, while analogical statistics referring to changes in the NMS-5 group domestic employment and in the corresponding evolution of labour markets in its partners are presented in the last two columns.

In general, the rise in employment in partner countries has been accompanied by the rise in domestic employment both in EU-15 and in NMS-5, where total tradable employment rose between 1995 and 2005 by 22.82 per cent and 16.63 per cent, respectively. It is evident, however, that if we look inside the tradable economy, the evolution of employment "at home" and abroad differs substantially across sectors.

As far as EU-15 domestic labour markets are concerned, the rise in employment in their partner countries is associated with the rise in domestic EU-15 employment in such sectors as: Food, beverages and tobacco, Transport equipment and in the services sector. In sectors such as: Rubber and plastic products, Basic metals and fabricated metal products and Machinery, nec the contraction of partner countries employment boosted domestic EU-15 employment. In the remaining sectors, employment diminished both "at home" (within the EU-15) and in the partner countries of Western economies.

Looking from the perspective of NMS-5 domestic labour markets, the rise in the size of their labour force in such sectors as: Rubber and plastic products, Transport eq. and recycling and the services sector (Renting of m&eq – other business services) has been accompanied by the rise of employment in the same sectors abroad. The expansion of NMS-5 sectors: Wood and products of wood and cork, Pulp, paper,

Table 7

Change in employment in tradable sectors at home and in partner countries (in %, by sector, two subgroups: EU-15 and NMS-5, 1995–2005)

	Old (EU-15)		New (NMS-5)	
	Home *EMP*	Partner countries *EMP_part*	Home *EMP*	Partner countries *EMP_part*
A	0.93	5.26	-12.53	4.6
B	-28.91	-38.05	-42.98	-21.66
C	-5.11	-3.47	8.61	-14.02
D	-9.95	-13.21	5.08	-7.23
E	-7.67	-20.99	-21.81	-16.78
F	2.44	-2.95	45.34	16.42
G	-6.59	-15.98	-17.54	-17.53
H	3.97	-6.87	-5.42	7.2
I	1.84	-11.27	-28.05	-3.39
J	-8.72	-26.88	35.02	-11.93
K	7.35	5.44	16.31	32.3
L	-5.24	-16.65	14.21	-25.08
M	57.58	64.52	77.48	60.58
Average	22.82	21.47	16.63	11.58

Note: A. Food, beverages and tobacco; B. Textiles, leather and footwear; C. Wood and products of wood and cork; D. Pulp, paper, printing and publishing; E. Chemicals and chemical products; F. Rubber and plastic products; G. Other non-metallic mineral products; H. Basic metals and fabricated metal products; I. Machinery, nec; J. Electrical and optical equipment; K. Transport eq.; L. Manufacturing, nec; recycling; M. Renting of m&eq – other business services.

Source: Elaboration with data from UN Comtrade and EU KLEMS.

printing and publishing, Electrical and optical equipment and Manufacturing, nec, recycling can be linked with the reduction of employment in these sectors in their trade partners. Lower employment in NMS-5 Food, beverages and tobacco and Basic metals and fabricated metal products sectors went in line with the rise of the size of these sectors in partner countries. Finally, both domestic NMS-5 and their partners employment contracted in the sectors: Textiles, leather and footwear, Chemicals and chemical products, Other non-metallic mineral products and Machinery, nec.

4.2. Labour market interdependency – econometric analysis

By means of econometric analysis we investigate whether the evolution of employment in partner countries has an effect on employment at home. To this end, we estimate the following dynamic model:

$$emp_{ijt} = \alpha + \beta_0 emp_{ijt-1} + \beta_1 emp\_part_{ijt} + \beta_2 y_{ijt} + + \beta_3 w_{ijt} + \delta D_t + \theta D_j + \eta_{ij} + \varepsilon_{ijt} \qquad (2)$$

where *emp* is the log of employment in country *i* and sector *j* at time *t*, *y* and *w* are respectively the log of real output and of the real wage in the same sector and country at time *t*, D_t refers to common

time effects and D_j controls for time invariant sector specificities common to all of the countries in the sample. The crucial variable of interest, *emp_part$_{ijt}$*, represents the log of average employment in partner countries, weighted by the importance of trade (imports) between the two countries *i* and *j* and measured as described in the (1).

Data on capital stock were not available for new Member Countries, for this reason no measure of capital intensity is present among the right-hand side variables. This obviously can create some problems in the estimates, which however is addressed with the inclusion of industry-fixed effects and time effects. Furthermore, time effects are allowed to vary according to the group typology, i.e. old and new Members, when the whole sample is considered. Finally, two different measures of employment are at hand: the number of persons engaged in production in a sector and the number of employees. Both measures are likely to be affected by partners' labour market evolution, so we alternate them in the estimation of the empirical model, actually they also convey different pieces of information. Foreign competition may well result in a reduction of employees in a sector and might not affect the overall number of persons engaged in production due to transformation of the organisation of production, which may see employees move to the self-employed category. By the same token, the measure of labour market interdependency described in the (1) above is calculated using both definitions of employment and the two definitions enter the empirical specification alternatively. Summary statistics of the variables used in the empirical analysis can be found in Table 12 in the Appendix.

The above empirical model is a dynamic panel data model and after a preliminary investigation made by confronting results from Ordinary Least Square, Fixed Effect and First Difference GMM estimator, the problem of weak instruments due to highly persistent series might be of concern in the present context. So we proceed using system GMM, we present the results for the first and second step, respectively SYS-GMM 1st step and SYS-GMM 2nd step below in the Tables, and for the latter we also apply the Windmejer small sample correction. In the final rows in each Table, we then report the P values for the Hansen J statistics and for the test for the absence of autocorrelation of order 2 (AR(2)), a failure to reject the null is expected to validate the assumptions underlying the use of the estimator. In both Tables, the test for the absence of autocorrelation of order 2 always passes. The Hansen test only barely fails to reject the null when the whole sample is considered, while the validity of the over-identifying restrictions is confirmed in the sub-samples.

Table 8 shows the results for the whole sample and, respectively, for new and old Members when persons engaged in production in the sector are used as measure of employment both "at home" and abroad. As far as the estimates of *emp_part* variable are concerned, overall estimates (columns 1 and 2) are not significant but when we split the sample and allow for heterogeneous effects across old and new members, we observe that for NMS-5 employment in partner countries acts as a stimulus to employment "at home". *Ceteris paribus*, a 1% rise in employment in EU partner countries of NMS (weighted by the magnitude of import flows) can be associated with around 10% rise in domestic employment in NMS-5 countries. For the old members, an increase in employment abroad negatively affects domestic employment – *ceteris paribus*, a 1% rise in employment in EU partner countries of EU-15 (weighted by the magnitude of import flows) can be associated with around 4% to 5% drop in domestic employment in EU-15 countries.

To check these results, we turn to the use of employees as definition for labour both "at home" and abroad. The estimates in Table 9 mimic the ones shown above in terms of the direction of employment interdependency and again, when the sample is split, we observe that domestic employment (the

Table 8
Domestic employment effects of labour market developments in partner countries (number of persons engaged in production)

	Dependent variable: domestic employment (persons engaged in production)					
	All Sample		New Members (NMS-5)		Old Members (EU-15)	
	SYS-GMM		SYS-GMM		SYS-GMM	
	1st step (1)	2nd step (2)	1st step (3)	2nd step (4)	1st step (5)	2nd step (6)
emp_{t-1}	0.975***	0.969***	0.989***	0.987***	0.981***	0.981***
	[0.007]	[0.010]	[0.008]	[0.013]	[0.006]	[0.008]
w	-0.742***	-0.735***	0.126	0.199	-0.372**	-0.334**
	[0.232]	[0.271]	[0.578]	[0.750]	[0.145]	[0.168]
y	0.062***	0.052**	0.045	0.045	0.015	0.013
	[0.020]	[0.025]	[0.034]	[0.041]	[0.021]	[0.023]
emp_part	-0.043	0.036	0.106**	0.098*	-0.043*	-0.047*
	[0.028]	[0.029]	[0.044]	[0.051]	[0.022]	[0.026]
Obs.	2470	2470	650	650	1 820	1 820
Groups	247	247	65	65	182	182
Hansen J	0.01	0.01	0.99	0.99	0.04	0.04
AR(2)	0.69	0.68	0.34	0.35	0.91	0.92

Note: Robust Standard Errors in Brackets. All estimates bear industry dummies and common time effects.

Table 9
Domestic employment effects of labour market developments in partner countries (Number of employees)

	Dependent variable: domestic employment (employees)					
	All Sample		New Members (NMS-5)		Old Members (EU-15)	
	SYS-GMM		SYS-GMM		SYS-GMM	
	1st step (1)	2nd step (2)	1st step (3)	2nd step (4)	1st step (5)	2nd step (6)
emp_{t-1}	0.979***	0.970***	0.983***	0.983***	0.982***	0.982***
	[0.009]	[0.012]	[0.014]	[0.019]	[0.005]	[0.006]
w	-0.721**	-0.723**	0.848	0.733	-0.438***	-0.379**
	[0.316]	[0.359]	[0.848]	[1.007]	[0.164]	[0.189]
y	0.044**	0.039	0.025	0.024	0.02	0.013
	[0.019]	[0.024]	[0.031]	[0.037]	[0.020]	[0.025]
emp_part	-0.039	-0.028	0.184**	0.173**	-0.050**	-0.043*
	[0.033]	[0.037]	[0.076]	[0.072]	[0.023]	[0.024]
Obs.	2470	2470	650	650	1820	1820
Groups	247	247	65	65	182	182
Hansen J	0.01	0.01	0.99	0.99	0.10	0.10
AR(2)	0.61	0.61	0.68	0.67	0.60	0.62

Note: Robust Standard Errors in Brackets. All estimates bear industry dummies and common time effects.

number of employees) in NMS-5 is positively affected by changes in the number of employees abroad (*ceteris paribus*, a 1% rise in employment in EU partner countries of NMS, weighted by the magnitude of import flows, can be associated with around 17–18% rise in domestic employment in NMS-5) while the opposite holds true for the old members that experience a decline in employment (the magnitude is comparable to the result obtained with persons engaged in production) when employment levels improve in their trade partners.

5. Conclusions

Given rather poor empirical evidence on the labour market effects on trade integration process in the enlarged EU context, this paper proposes an empirical assessment of economic interactions between the labour markets of the integrating EU, not limited to case studies, but providing more general approach. We focus on EU-15 and NMS-5 (namely: Poland, Hungary, the Czech Republic, Slovak Republic and Slovenia) over the period of time 1995–2005 (the decade when major trade liberalisation reforms were implemented in East–West economic relations). Drawing on recently made available industry statistics, we provide a sector level study (13 tradable sectors, including manufacturing and services), analysing the contemporary evolution of domestic and trade partners' employment levels. The key idea is that if the technology of production is fragmented across EU countries, employment levels and structures also depend on the level and composition of the labour force of the EU trading partners.

The major question is what kind of relations – complementarity of substitution – exists between domestic and foreign employment within the EU. Political worries often see low-cost Eastern economies as a threat to EU-15 labour, while the creation of jobs in NMS is of crucial importance. We build a sector-specific measure of economic interdependency, based on information on labour markets performance in individual countries and weighted by the magnitude of intra-EU trade flows (imports). We apply dynamic estimation techniques aiming at revealing the link between the domestic and foreign employment levels, allowing for endogenous trade effects of integration.

The estimates reveal a certain degree of economic interdependency within the EU, but the effects are different for EU-15 and NMS-5 economies. Domestic labour markets (in terms of all persons engaged in production and the number of employees) in countries belonging to the NMS-5 group are rather positively affected by the expansion of labour markets in other EU trade partners – it means that employment levels in NMS-5 countries tend to improve parallelly to the increase of employment in foreign tradable sectors. The opposite holds true for EU-15 domestic labour markets, where the size of labour force employed in tradable sectors is rather challenged by improvements in employment levels in their trade partners from the EU.

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Acknowledgements

Appendix

Table 10
List of countries

| EU-15 (Old) | | NMS | | | |
		NMS-12		NMS-5 (New)	
AUT	Austria	BLG	Bulgaria	CZE	Czech Republic
BLX	Belgium and Luxembourg	CYP	Cyprus	HUN	Hungary
DNK	Denmark	CZE	Czech Republic	POL	Poland
ESP	Spain	EST	Estonia	SVK	Slovak Republic
FIN	Finland	HUN	Hungary	SVN	Slovenia
FRA	France	LTU	Lithuania		
GER	Germany	LVA	Latvia		
GRC	Greece	MLT	Malta		
IRL	Ireland	POL	Poland		
ITA	Italy	ROM	Romania		
NLD	Netherlands	SVK	Slovak Republic		
PRT	Portugal	SVN	Slovenia		
SWE	Sweden				
UK	United Kingdom				

Table 11
List of sectors

A. Food, beverages and tobacco
B. Textiles, leather and footwear
C. Wood and products of wood and cork
D. Pulp, paper, printing and publishing
E. Chemicals and chemical products
F. Rubber and plastic products
G. Other non-metallic mineral products
H. Basic metals and fabricated metal products
I. Machinery, nec
J. Electrical and optical equipment
K. Transport equipment
L. Manufacturing, nec; recycling
M. Renting of machinery and equipment – other business services

Table 12
Summary statistics (empirical model)

Variable		Mean	Std. Dev.	Min.	Max.	Observations
emp Persons engaged	overall	4.51	1.25	1.75	8.46	N = 2 717
	between		1.25	2.04	8.25	n = 247
	within		0.10	3.89	5.04	T = 11
w Compensation of persons engaged in production	overall	0.03	0.02	0.01	0.30	N = 2717
	between		0.01	0.01	0.16	n = 247
	within		0.01	-0.07	0.17	T = 11
emp Employees	overall	4.41	1.24	1.53	8.28	N = 2 717
	between		1.24	1.81	8.09	n = 247
	within		0.11	3.76	5.07	T = 11
w Compensation of employees	overall	0.03	0.02	0.01	0.30	N = 2717
	between		0.01	0.01	0.16	n = 247
	within		0.01	-0.07	0.17	T = 11
y Output	overall	4.81	0.29	3.91	7.20	N = 2 717
	between		0.23	4.18	6.26	n = 247
	within		0.18	3.16	5.75	T = 11
emp_part Persons engaged in production in partner countries (weighted by import shares)	overall	5.85	0.75	4.09	8.32	N = 2717
	between		0.75	4.16	8.07	n = 247
	within		0.09	5.01	6.26	T = 11
emp_part Employees in partner countries (weighted by import shares)	overall	5.76	0.76	3.91	8.14	N = 2717
	between		0.75	4.00	7.90	n = 247
	within		0.09	4.90	6.18	T = 11