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Alessia Lo Turco* and Aleksandra Parteka**

EU Enlargement and Labour Demand in the New Member States

Research to date on labour market responses to EU integration has tended to concentrate on the labour markets of the "old" EU members. But what effect has the integration of trade had on wages in the new member states? The following article attempts to answer this question using an empirical model of conditional sectoral labour demand.

The previous two decades in Europe have been characterised by a dynamic process of East-West integration. Trade barriers between the EU15 and Central and Eastern European Countries (hereafter CEECs) were to a large extent already removed in the mid-1990s (Europe Agreements), which led to an intensification of links between the two groups of countries. Since the trade reorientation of the early 1990s, related to the collapse of the Soviet Union and the major political and economic changes in those European countries previously under its dominion, the economic structures of countries that eventually joined the EU in 2004 and 2007[1] (New Member States – NMS) have become ever more integrated with EU15 markets.[2] Increasing integration also resulted in an intensification of the mobility of production factors across Europe and the cross-border integration of different phases of production. Already in the 1990s, CEECs became important hosts for the outsourcing practices of the EU15, owing to substantial wage advantages.[3] Outward processing trade in CEECs rose considerably throughout the 1990s.[4] Nowadays, CEECs' total exports to the EU15 are strongly linked to the fragmentation of production. The resulting similarity in export structures between the two groups of countries has been found to have had a positive impact on the catching up process.[5] In addition, CEECs became a target for large FDI flows, largely due to labour cost and productivity patterns.[6] Integration also led to the intensification of migration flows, especially after the biggest EU enlargement in 2004 when some EU15 countries opened their labour markets to the new entrants.[7]

All of these changes accompanying the process of East-West integration in Europe must have affected labour markets in the NMS. However, with few exceptions, the literature on recent developments in European integration has primarily focused on the empirical analysis of its effects on EU15 economies. With regard to the labour market effects of integration, surprisingly little empirical research has been dedicated to the effects of integration on the new EU members' labour force. Moreover, the general lack of comparable sector-level statistics over time for both "old" and "new" EU members has thus far prevented researchers from exploring the topic in a setting conducive to detecting the heterogeneous effects of integration on labour employed in different sector types.

We aim to contribute to the existing empirical literature on the labour market effects of EU integration by exploring the issue from the point of view of the newcomers. We make use of recently released detailed sector-level labour statistics concerning some of the NMS and EU15 countries. Due to data availability, we focus on the economies of the Czech Republic, Hungary, Poland, Slovenia and Slovakia (denoted as NMS5) through the period 1995-

* Polytechnic University of Marche, Ancona, Italy.
** Gdansk University of Technology, Gdansk, Poland.
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1 Ten countries (Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovenia and Slovakia) joined the EU in 2004; Bulgaria and Romania acceded in 2007.
2 For example in 2005, 61% of exports from NMS were directed to EU-15 countries, compared to 46% in 1990 (data from UN Comtrade). For more empirical evidence see B. Kaminski, F. Ng: Production disintegration and integration of Central Europe into global markets, in: International Journal of Economics and Finance, Vol. 14, 2005, pp. 377-390.
3 S. Baldone, F. Sdogati, L Tajoli: Patterns and determinants of international fragmentation of production: evidence from outward processing trade between EU and Central Eastern European Countries, in: Weltwirtschaftliches Archiv, Vol. 137, No. 1, 2001, pp. 80-104.
4 H. Egger, P. Egger: The determinants of EU processing trade, in: The World Economy, Vol. 28, No. 2, 2005, pp. 147-168.
5 L. De Benedictis, L. Tajoli: Similarity in trade structures, integration and catching-up, in: Economics of Transition, Vol. 16, No. 2, 2008, pp. 165-182.
6 C. Bellak, M. Leibrecht, A. Riedl: Labour costs and FDI flows into Central and Eastern European Countries: A survey of the literature and empirical evidence, in: Structural Change and Economic Dynamics, Vol. 19, No. 1, 2008, pp. 17-37.
7 For a recent survey on migration in the enlarged EU see M. Kahanec, K. Zimmermann: Migration in an enlarged EU: a challenging solution, CEPR Discussion Paper No. 7200, 2008.

2005. In particular, we consider the response of NMS5-based labour to wage conditions in trade partners from both "old" (EU15) and "new" EU members. One important innovation is that in order to detect cross-border interdependence between European labour markets, the domestic demand for labour in the NMS5 is assumed to be affected not only by its own price but also by labour costs in partner countries. *Ceteris paribus* an increase in foreign wages either increases or decreases the demand for labour according to the degree of complementarity and substitution existing between domestic and foreign labour inputs. The key idea is that trade integration brings about the fragmentation of technology across countries; consequently, domestic employment levels also depend on labour market conditions in trading partners, thus making domestic and foreign labour interdependent. We test this hypothesis with regard to the specific case of our five CEECs. Moreover, given the rising importance of trade in services, we extend the traditional focus of the empirical analysis beyond manufacturing and also take into account the business services sector. Finally, we control for the heterogeneous responses of NMS5 labour to foreign wages across sectors with different skill intensities.

The rest of the paper is organised as follows. In the next section, we review the theory and the empirical literature on the labour market effects of trade integration. Next, we examine the data and present some descriptive statistics on trade and employment concerning the NMS5 (and in some cases NMS12) over the period 1995-2005. We then explore the response of domestic labour markets in the NMS5 to the evolution of wage conditions in "old" EU members and in other "new" EU countries. Finally, we draw our conclusions.

Literature Review

The main issue raised by our analysis is the interdependency of labour markets within the EU, as manifested by the impact of wage conditions in partner countries on the domestic demand for labour. Economic theory has addressed the nature of the relationship between domestic and foreign labour inputs (whether they are complements or substitutes) in several manners and, according to the approach followed, different outcomes have emerged. Continued globalisation, which results in more intense final and intermediate goods exchange, is reflected in the rapidly growing literature on the impact of international trade integration on domestic labour markets, in particular on wages.[8] In early contributions, which focused on the effects of production disintegration and outsourcing on wages (the rising inequality between the wages of skilled and unskilled workers in developed countries has been a major concern), it was usually assumed that foreign labour was a substitute for domestic labour.[9] In such a framework, the final effects of trade in intermediates on the wages of the unskilled very much depend on the initial hypothesis of the model. Contributions assuming a single final good[10] show that trade in the low skill intensive parts of the production process leads to a reduction in the wages and the relative demand for unskilled workers in advanced countries, and these workers are replaced by workers in developing countries. On the other hand, in a framework assuming two final goods[11], more labour intensive parts of production may be sent to labour abundant countries, but wages and employment may also increase in advanced countries' labour intensive sectors due to regained competitiveness. Consequently, the substitution of domestic labour by foreign labour is not the only plausible outcome, and an increase in employment abroad does not necessarily have to correspond to a reduction of labour demand at home.

Another view is presented in the outsourcing model where capital is a sector specific factor. When FDI is accompanied by outsourcing, labour always loses, and when arm's length transactions are the only possibility, then the factor-intensity of the outsourced portion is relevant for the final outcome on wages.[12] Consequently, when the outflow of capital is taken into account, an important degree of substitution can exist between the activities performed domestically and abroad.

Further work on the topic highlights the relevance of treating the issue in a general equilibrium setting, for example with endogenous outsourcing dependent on the level of

8 For a contribution reviewing the state of knowledge so far see P. Krugman: Trade and wages, reconsidered, in: Brookings Papers on Economic Activity, Vol. 2008, No. 1, 2008, pp. 103-154.

9 R.C. Feenstra: Integration of trade and disintegration of production in the global economy, in: Journal of Economic Perspectives, Vol. 12, No. 4, 1998, pp. 1931-1935; R.C. Feenstra, G.H. Hanson: Foreign investment, outsourcing and relative wages, in: R.C. Feenstra G. Grossman, D. Irwin (eds.): The Political Economy of Trade Policy: Paper in Honour of Jagdish Bhagwati, Cambridge 1996, MIT Press, pp. 89-127; R.C. Feenstra, G.H. Hanson: The impact of outsourcing and high-technology capital on wages: Estimates for the United States, 1979-1990, in: Quarterly Journal of Economics, Vol. 114, 1999, pp. 907-940; D. Hummels, J. Ishii, K. Yi: The nature and growth of vertical specialization in world trade, in: Journal of International Economics, Vol. 54, 2001, pp. 75- 96.

10 R.C. Feenstra, G.H. Hanson: Foreign investment, outsourcing and relative wages, op. cit.; R.C. Feenstra, G.H. Hanson: The impact of outsourcing ..., op. cit.; R.C. Feenstra, G.H. Hanson: Global production sharing and rising inequality: a survey of trade and wages, in: E. Kwan Choi, J. Harrigan (eds.): Handbook of International Trade, London 2003, Basil Blackwell.

11 S.W. Arndt: Globalization and the open economy, in: North American Journal of Economics and Finance, Vol. 8, 1997, pp. 71-79.

12 W. Kohler: A specific-factors view on outsourcing, in: North American Journal of Economics and Finance, Vol. 12, 2001, pp. 31-53.

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domestic and foreign input prices.[13] Recent articles propose a "new paradigm" of the international unbundling of tasks,[14] which recalls previous theoretical suggestions that found foreign low-skilled labour was not necessarily a loser of globalisation. The "productivity" effect caused by the unbundling may actually reverse the negative effect of foreign competition, since the number of domestic and foreign tasks may grow, while at the same time domestic labour moves towards those tasks which are more difficult to trade. However, when the prices of final goods change, this conclusion can be challenged, especially if the unbundling does not concern the offshoring of a single type of tasks but rather a complete bundle of tasks involving different types of labour.[15]

The empirical literature on the effects of trade on the labour market nexus has focused mainly on advanced countries and the possible threat that North-South integration could pose to domestic labour in more developed economies. In the European context, the major focus has been on the implications of integration with less developed CEECs for EU15 labour markets, especially with regard to whether workers in the latter countries are negatively or positively affected by the fragmentation of the production process across Europe. Before the EU enlargement, the primary emphasis had been placed on predicting the likely outcomes of trade integration with Eastern Europe.[16] The evidence from the late 1990s shows that the negative impact of outsourcing to low-wage CEECs on the demand for labour in selected EU15 countries (Austria, Finland, Germany, Italy and the Netherlands) was relatively small, especially when compared to the effects of intermediate materials imports from China and the East Asian countries.[17] Some country-specific studies have focused on analysing the implications of CEECs' integration with the EU for individual Western European economies, especially those where the effects could be particularly strong due to geographical proximity, such as Germany or Austria.

13 W. Kohler: International outsourcing and the factor prices with multistage production, in: The Economic Journal, Vol. 114, 2004, pp. 166-185.

14 G.M. Grossman, E. Rossi-Hansberg: The rise of offshoring: it's not wine for cloth anymore, in: The New Economic Geography: Effects and Policy Implications, Federal Reserve Bank of Kansas City, 2006; G.M. Grossman, E. Rossi-Hansberg: Trading tasks: a simple theory of offshoring, in: American Economic Review, Vol. 98, No. 5, 2008, pp. 1978-1997.

15 W. Kohler: Offshoring: why do the stories differ? in: Cesifo Working Paper No. 2232, 2008.

16 T. Boeri, H. Brücker: Eastern enlargement and EU labour markets. Perceptions, challenges and opportunities, in: World Economics, Vol. 2, No. 1, 2001, pp. 49-68.

17 M. Falk, Y. Wolfmayr: Services and materials outsourcing to low-wage countries and employment: empirical evidence from EU countries, in: Structural Change and Economic Dynamics, Vol. 19, No. 1, 2008, pp. 38-52.

The effects of outsourcing to Eastern Europe on domestic employment in these two countries, especially in less skill-intensive industries, have been found to be relatively strong.[18] Moreover, in more distant countries like Spain, the impact of outsourcing to CEECs on domestic labour structures has also been confirmed.[19]

Very little empirical research has been dedicated to the effects of trade integration in Europe on labour markets in New Member States. Existing studies on NMS employment either review general developments (productivity, employment levels etc.) in the period of economic restructuring and structural change[20] or focus on the impact of trade on wages in NMS. Exports have been found to exert a negative effect (and imports a positive one) on manufacturing earnings in CEECs.[21] However, both intermediate goods exports and imports seem to have had a positive effect on unskilled workers' wage bill (both in absolute terms and relative to the skilled workers) in these countries.[22] Additionally, the process of trade-induced factor price equalisation has been analysed: it has been argued that intermediate goods trade (outsourcing) fostered the process of sigma wage convergence across selected CEECs, as well as between the EU15 and CEECs.[23]

18 I. Geishecker: Does Outsourcing to Central and Eastern Europe really threaten manual workers' jobs in Germany? in: The World Economy, Vol. 29, No. 5, 2006, pp. 559-583; H. Egger, P. Egger: Outsourcing and skill-specific employment in a small economy: Austria and the fall of the Iron Curtain, in: Oxford Economic Papers, Vol. 55, 2003, pp. 625-643.

19 M. Cadarso, N. Gómez, L. López, M. Tobarra: The EU enlargement and the impact of outsourcing on industrial employment in Spain, 1993–2003, in: Structural Change and Economic Dynamics, Vol. 19, No. 1, 2008, pp. 95-108.

20 Among others: P. Havlik, M. Landesmann: Structural change, productivity and employment in the new EU member states, in: Economic restructuring and labour markets in the accession countries, Research Project commissioned by EU DG Employment, Social Affairs and Equal Opportunities, 2005; M. Landesmann, H. Vidovic: Employment Developments in Central and Eastern Europe: Trends and Explanations, in: wiiw Research Reports, No. 332, Vienna 2006; P. Havlik, S. Leitner, R. Stehrer: Growth Resurgence, Productivity Catching-up and Labour Demand in CEECs, in: wiiw Statistical Reports No. 3, 2008.

21 H. Egger, P. Egger: How international outsourcing drives up eastern wages, in: Weltwirtschaftliches Archiv, Vol. 138, No. 1, 2002, pp. 83-96; Ö. Onaran, E. Stockhammer: The effect of FDI and foreign trade on wages in the Central and Eastern European Countries in the post-transition era: A sectoral analysis for the manufacturing industry, in: Structural Change and Economic Dynamics, Vol. 19, No. 1, 2008, pp. 66-80.

22 P. Egger, R. Stehrer: International outsourcing and the skill-specific wage bill in Eastern Europe, in: The World Economy, Vol. 26, No. 1, 2003, pp. 61-72.

23 P. Egger, M. Pfaffermayer: Two dimensions of convergence: national and international wage adjustments effects of cross-border outsourcing in Europe, in: Review of International Economics, Vol. 12, No. 5, 2004, pp. 833-843; P. Egger: Intermediate goods trade and international wage convergence in Central Europe, in: Empirica, Vol. 33, 2006, pp. 181-192.

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To our knowledge, none of the existing contributions explores the response of employment in NMS to wages in EU partner countries in the decade following the Europe Agreements. Our research aims at filling this gap.

Data Description and Descriptive Statistics

In order to address directly the relationship between the economic structures of trade partners and the NMS labour demand resulting from trade integration, we use disaggregated trade and industrial statistics for five of the ten NMS which joined the EU in 2004 (the aforementioned NMS5, which we include in the "new" group). Unfortunately, detailed industrial statistics are not yet available for the remaining NMS. However, in the course of analysis we will provide evidence relating to all countries that joined the EU in 2004 and 2007. In order to avoid confusion with the NMS5, we denote them as NMS12.

The key characteristic of our study is the construction of a dataset matching labour and trade statistics at the single sector level. The EU KLEMS Growth and Productivity Accounts database[24] is our primary source for the data on old and new EU countries' labour markets (employment levels in each sector, variables needed for the calculation of average wages such as labour compensation and the number of hours worked, as well as sector specific output and input price indices used to report the variables into real terms). We use bilateral exchange rates from EUROSTAT to recalculate original statistics that were reported in national currencies into euros.

Trade data (the value of bilateral trade within the same sector between the NMS5 and their EU partners from our sample, as well as the value of total trade with all world partners) come from the UN COMTRADE database and were retrieved through the WITS system.[25] The use of this data source allows us to obtain recalculated series of trade values consistent with the NACE classification and the EU KLEMS industry list.

In the end, in order to match trade and industrial statistics, we aggregate all available statistics into 13 sectors, grouped into high and low skill intensive categories (Table 1).[26] One important feature of our data is the fact that we do not focus solely on manufacturing but also consider the business services sector. Complete labour market data for NMS are not available prior to the year 1995, thus our analysis focuses on the NMS5 in the period 1995-2005.

Table 1
List of Sectors

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

Note: Skill typology of sectors from EU KLEMS.

The increasing level of economic integration in Europe has resulted in the intensification of trade relations between Western Europe and the countries which eventually joined the EU in 2004 and 2007. From the point of view of our analysis, we are particularly interested in the dynamics of trade integration with EU15 markets as seen from the perspective of NMS. Table 2 presents the dynamics and significance of trade flows between the NMS12 or NMS5 and the EU15.

Imports from the EU15 occupy a very large proportion of the total imports reported by "new" EU countries, which proves their great dependency on "old" EU members as primary trade partners. Depending on the sector, imports from the EU15 in 2005 accounted for 46.9% to 72.2% (the highest figure being for "rubber and plastic products") of the total global imports reported by NMS12 countries, while from 47.7% to 75.3% of total global imports reported by the NMS5 came from the EU15 (where the highest figure was for "renting of machinery and equipment and other business services").

24 The EU KLEMS Growth and Productivity Accounts, University of Groningen and University of Birmingham; downloadable at www.EU KLEMS.net. We use the data from the latest release in 2008. All the series in the EU KLEMS database have been created on the basis of statistics provided by National Statistical Institutes (NSIs) with particular emphasis put on the harmonisation of the basic data, ensuring cross sample comparability. A detailed description of the database and related methodology can be found in: M. Timmer, T. van Moergastel, E. Stuivenwold, G. Ypma, M. Mahony, M. Kangasniemi: The EU KLEMS Growth and Productivity Accounts: Version 1.0, Part I: Methodology, 2007 (downloadable at www.EU KLEMS.net).

25 World Integrated Trade Solutions (wits.worldbank.org).

26 The classification of sectors comes from EU KLEMS.

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Table 2
Share of Import Flows from EU15 Countries to NMS12 and NMS5 (by sector)

	Sector	Imports from EU15 to NMS12 (% total NMS12 world imports) 1995	2005	Δ1995-2005 (%)	Imports from EU15 to NMS5 (% total NMS5 world imports) 1995	2005	Δ1995-2005 (%)
A	Food, beverages and tobacco	53.7	54	0.5	57.3	56.2	-2.0
B	Textiles, leather and footwear	74.9	64.3	-14.2	72.7	58.9	-18.9
C	Wood and products of wood and cork	54.1	46.9	-13.4	50.6	52.8	4.3
D	Pulp, paper, printing and publishing	71.3	68.4	-4.0	72	70.6	-2.0
E	Chemicals and chemical products	61	66.6	9.2	62.6	68.6	9.6
F	Rubber and plastics products	73.7	72.2	-2.0	75.6	75	-0.8
G	Other non-metallic mineral products	69.1	58	-16.0	69.2	62.1	-10.3
H	Basic metals and fabricated metal products	58.4	62	6.2	59.2	64.5	9.0
I	Machinery, nec	78.5	71.8	-8.5	79.9	72.7	-9.0
J	Electrical and optical equipment	63.9	49	-23.3	63.7	47.7	-25.1
K	Transport equipment	71.7	69.7	-2.9	76.2	71.1	-6.7
L	Manufacturing, nec; recycling	68.6	53.2	-22.5	67.9	52.4	-22.8
M	Renting of m&eq – other business services	67.2	71.3	6.2	66.2	75.3	13.7

Source: own calculations based on UN Comtrade data.

Between 1995 and 2005, the share of import flows from EU15 countries as a percentage of total imports reported by the NMS12 and NMS5 diminished in most sectors. However, the importance of imports from the EU15 to the overall import structure of the "new" EU countries rose considerably in such high skill intensive sectors as "chemicals and chemical products" and "renting of machinery and equipment and other business services". This was also true in the less skill intensive "basic metals and fabricated metal products" sector and, in the case of the NMS5, also in the "wood, products of wood and cork" sector.

Analysing the changes in sector-specific normalised trade balances in trade flows between New Member States and the EU15 (Table 3)[27], we can confirm that the NMS12 as a group tend to occupy the position of a net exporter, especially in sectors requiring rather low skill labour, such as "textiles, leather and footwear" and "wood and products of wood and cork". However, the fact that the NMS12 developed from net importers to net exporters of products coming from sectors typically perceived as more skill intensive (such as "electrical and optical equipment" and "transport equipment") between 1995 and 2005 is particularly important. This transformation is even more evident if we take into account the restricted group of the NMS5 only.

We now turn to the description of sectoral patterns of employment in NMS5 countries (unfortunately, complete labour statistics for the remaining NMS are unavailable). Since our study focuses on possible interdependencies between European labour markets as seen from the perspective of "newcomers", the key question is whether there is substitution or complementarity between the NMS5 domestic labour force and foreign workers employed in their EU trade partners. We distinguish between partners belonging to the "old" (EU15) and "new" (NMS5) groups, so that for each of our five countries of interest (the Czech Republic, Hungary, Poland, Slovenia and Slovakia), we consider 19 partners: 15 from the "old" group and 4 from the "new" group).

In order to trace the contemporary evolution of employment "at home" and abroad, in Table 4 we present the percentage changes in employment levels (in terms of persons engaged) in single sectors between 1995

27 In this specific case, the normalised trade balance is calculated as:

$$\frac{EXP_{fromNMS12toEU15} - IMP_{toNMS12fromEU15}}{EXP_{fromNMS12toEU15} + IMP_{toNMS12fromEU15}} * 100\% \text{ or}$$

$$\frac{EXP_{fromNMS5toEU15} - IMP_{toNMS5fromEU15}}{EXP_{fromNMS5toEU15} + IMP_{toNMS5fromEU15}} * 100\%.$$

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Table 3
Normalised Trade Balance* between NMS12 (NMS5) and EU15 (by sector)

		NMS12 vs EU15		NMS5 vs EU15	
	Sector	1995	2005	1995	2005
A	Food, beverages and tobacco	-19.4	-11.1	-9.7	-2.2
B	Textiles, leather and footwear	14.2	9.9	15.5	2.6
C	Wood and products of wood and cork	65.6	50.1	69.3	42.8
D	Pulp, paper, printing and publishing	-38.8	-22.3	-33.5	-15.3
E	Chemicals and chemical products	-36.8	-51.7	-35.9	-48.9
F	Rubber and plastics products	-33.4	-22.3	-29.8	-16.8
G	Other non-metallic mineral products	9-Apr	-6.4	14.8	2.7
H	Basic metals and metal products	18.4	-4.1	20	-2.4
I	Machinery, nec	-46.2	-15.6	-41.5	-7.7
J	Electrical and optical equipment	-24.8	13.3	-23.9	18.9
K	Transport equipment	-14.9	9.8	-9.5	19.1
L	Manufacturing, nec; recycling	35.2	48.6	36.3	52.2
M	Renting of m&eq – other business services	-43.9	-25.5	-37.3	-15.5

* Calculated according to the formulas in note 27 in the text.

Source: Own calculations based on UN Comtrade data.

Table 4
Change in Employment Levels* in NMS5 and in NMS5's EU Trade Partners (in %, 1995-2005)

		Domestic NMS5	Old EU trade Partners	New EU trade Partners
	Sector	(1)	(2)	(3)
A	Food, beverages and tobacco	-12.53	9.09	14.13
B	Textiles, leather and footwear	-42.98	-23.47	-34.72
C	Wood and products of wood and cork	8.61	-26.03	42.81
D	Pulp, paper, printing and publishing	5.08	-8.38	29.01
E	Chemicals and chemical products	-21.81	-20.85	-3.46
F	Rubber and plastics products	45.34	10.01	113.68
G	Other non-metallic mineral products	-17.54	-18.85	14.46
H	Basic metals and metal products	-5.42	-1.92	6.46
I	Machinery, nec	-28.05	-3.12	-24.24
J	Electrical and optical equipment	35.02	-9.73	50.54
K	Transport equipment	16.31	31.76	46.28
L	Manufacturing, nec; recycling	14.21	-21.58	20.06
M	Renting of m&eq – other business services	57.58	54.03	96.26

* Persons employed.

Source: Own calculations based on EU KLEMS data. Weighted averages (by imports from partner countries).

and 2005 in the NMS5 (the first column) and the corresponding evolution of employment in their "old" and "new" EU trade partners. In order to take into account the magnitude of bilateral trade flows and potentially major interactions between the labour structures of countries that trade with each other more extensively, we report the weighted average of employment levels in the NMS5's trading partners, with the weights corresponding to imports from each partner to the NMS5 in the same sector.

The general message is that between 1995 and 2005, domestic employment in the NMS5 rose in 7 out of the 13 sectors taken into consideration, the services sector expanded noticeably, and manufacturing was characterised by more heterogeneity. When we take into consideration the contemporary evolution of employment in the NMS5 and their partner countries, it turns out that employment levels increased in parallel (a sign of complementarity) in both the NMS5 and the EU15 in only three sectors ("rubber and plastics products", "transport equipment" and in the services sector). In both the NMS5 and their "old" partners, employment shrank in "textiles, leather and footwear", a sector exposed to increasing competition, especially from Asian markets. The same was true of the "chemicals" and "other non-metallic mineral products" sectors. From the point of view of potential competition between EU15 and NMS5 workers, those sectors are particularly interesting in which employment levels improved in the latter countries while declining in the former ones: "wood products", "pulp, paper, printing

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and publishing", "electrical and optical equipment" and "manufacturing nec". Note that in the sector producing advanced electrical and optical equipment (sector J), employment in NMS5 countries rose by around 35% on average (persons employed), while simultaneously decreasing by almost 10% in the EU15. The contemporary evolution of domestic and foreign employment within the NMS5 group - columns (1) and (3) – shows that in most cases changes in employment levels went in the same direction, indicating complementarity in the relations between the five countries from Central and Eastern Europe. There are a few exceptions, though, suggesting the potential substitutability of domestic Czech, Polish, Hungarian, Slovenian or Slovak labour by foreign workers from the same group of countries: in the "food, beverages and tobacco", "other non-metallic mineral products", and "basic metals and metal products" sectors, the reduction of domestic employment in some "new" countries occurred in tandem with the expansion of employment in the other "new" countries.

Modelling the Response of Domestic NMS5 Labour to Foreign Wages

In order to assess the degree of complementarity/substitutability between domestic NMS5 and foreign workers, we focus on the response of domestic NMS5 employment in a given sector to the overall average labour cost in the same sector in partner countries. The basis for our empirical setting is the measurement of the average labour cost in partner countries (foreign wage proxy), weighted by the importance of their bilateral trade with the country of interest. Let's denote average wage in partner countries as *WP* and its log as *wp*.

The trading partners within the EU are very heterogeneous as a result of their different income levels, stages of development, economic structures and time of accession to the EU. For this reason, for every country from the NMS5 group, we build two distinct measures of the average wage in partner countries, which we divide into two groups ("old" and "new"). First of all, we index with *q* the *Q* partners in our sample of EU economies, and for every "new" country (NMS5), we rank its "new" partners from *1* to *p* and the "old" ones (EU15) from *p+1* to *Q*, so that each of the NMS5 countries has 4 "new" partners and 15 "old" partners. Then, for every NMS5 country *i* (*i=1, .. , 5*), sector *j* (*j=1, … ,13*) and time *t* (*t=1995, … ,2005*), we construct two separate measures of weighted average labour cost for "new" and "old" partner countries, respectively:

$$WP^{new}_{ijt}=(\sum^{p}_{q=1} imp_{iqjt} * w_{qjt}) / (\sum^{p}_{q=1} imp_{iqjt}) \quad (1)$$

$$WP^{old}_{ijt}=(\sum^{Q}_{q=p+1} imp_{iqtj} * w_{qjt}) / (\sum^{Q}_{q=p+1} imp_{iqjt}) \quad (2)$$

The average sector-level wage in the partners (WP^{z}_{ijt} for *z*="new", "old") of each country *i* is obtained as the weighted average of *i*'s partners' wages, w_{qjt}, in the same sector *j*, with weights equal to country *i*'s imports (*imp*) from partner *q* in the same sector *j* and time *t*. We adopt such a weighting scheme because it allows us to consider trade-based interactions between labour markets at home and abroad: foreign wage conditions in partner *q* can matter for country *i* as long as trade between *i* and *q* is present. Therefore, in light of possible competition/complementarity between groups of workers in separate countries due to progressing trade liberalisation and offshoring practices, we assign greater importance to the evolution of wage conditions in those partner countries from which country *i* imports more than from other partners.

The measures defined in (1) and (2) are used in the estimation of the relationship between "new" countries' domestic labour and their EU partners' labour markets. In other words, we test whether domestic employment levels (*L*) in NMS5 countries are in any way influenced by wages paid to labour employed in analogous foreign sectors within the integrating EU, i.e. whether imports from EU partner countries can substitute for the NMS5 domestic labour force. To this aim, we estimate the following dynamic model of conditional labour demand:

$$L_{ijt} = \alpha + \beta_0 L_{ijt-1} + \beta_1 wp^{new}_{ijt} + \beta_2 wp^{old}_{ijt} + \beta_3 y_{ijt} + \beta_4 w_{ijt} + \gamma_0 D_i + \gamma_1 D_j + \gamma_2 D_t + \mu_{ij} + \varepsilon_{ijt} \quad (3)$$

where *L* is the log of domestic employment in country *i* (belonging to the NMS5 group) and sector *j* at time *t*; *y* is the log of real domestic output and *w* represents the real wage in the same sector and country at time *t*. D_i, D_j and D_t represent country, industry and time dummies respectively, while μ_{ij} reflects country-sector specificity that we address in the estimations. Finally, wp^{new} and wp^{old} are the logs of the two measures of average labour cost in "new" and "old" partner countries defined in (1) and (2). They are among the variables on the right-hand side influencing domestic labour demand, so our main

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coefficients of interest are represented by β_1 and β_2. All variables enter into the model in natural logs, enabling us to interpret estimated coefficients as elasticities. In particular, a positive elasticity of domestic employment with respect to foreign wages implies a certain degree of substitution between NMS5 domestic labour and the foreign labour force, while a negative elasticity of *L* with respect to *wp* is a sign of complementarity between NMS5 domestic labour and foreign workers.

As far as the measure of domestic employment (*L*) is concerned, we decided to alternate the number of persons engaged and the number of hours worked in a sector. These two variables convey different pieces of information: trade integration may well concern an increase or decrease in the hours worked by people engaged in a given sector, while the overall number of workers does not increase or decrease. In response to foreign competition, firms might be willing to reduce their number of workers and increase the number of hours worked by those that are still employed. Unfortunately, data on capital stocks were not available for NMS, and for this reason no measure of capital intensity is present among the right-hand side variables in (3). We try to address this by the inclusion of industry, country and time dummies. Summary statistics of the variables used in the empirical analysis below can be found in Table 5.

Table 5
Summary Statistics

Variable		Mean	Std. Dev.	Min	Max	Observations
L	overall	4.23	1.00	2.29	6.63	N = 715
Persons employed in NMS5	between		1.00	2.37	6.37	n = 65
	within		0.12	3.74	4.60	T = 11
L	overall	4.84	1.02	2.84	7.24	N = 715
Hours worked in NMS5	between		1.02	2.92	7.02	n = 65
	within		0.12	4.37	5.18	T = 11
w	overall	-0.75	1.71	-3.49	2.44	N = 715
Average compensation of domestic NMS5 labour	between		1.71	-3.34	2.11	n = 65
	within		0.23	-1.67	0.15	T = 11
y	overall	4.94	0.39	4.31	7.20	N = 715
Output in NMS5	between		0.30	4.49	6.26	n = 65
	within		0.26	3.29	5.88	T = 11
wp^{old}	overall	-1.54	0.25	-1.96	-0.83	N = 715
Average compensation of foreign labour (partners from EU15)	between		0.23	-1.85	-1.04	n = 65
	within		0.09	-1.81	-1.19	T = 11
wp^{new}	overall	-3.70	0.31	-4.78	-2.83	N = 715
Average compensation of foreign labour (partners from NMS5)	between		0.22	-4.28	-3.38	n = 65
	within		0.23	-4.20	-3.02	T = 1

Note: All variables in logs.

Results

The following Tables 6, 7 and 8 report the estimated results of model (3) presented above. In order to allow for heterogeneous responses from domestic labour to foreign wages in different types of economic activities, we perform the estimations in the full sample of all 13 sectors (results presented in Table 6), in a sample consisting of manufacturing sectors only (Table 7) and, finally, in a subsample of low skill-intensive manufacturing sectors (Table 8), as defined by the EU KLEMS taxonomy presented in Table 1. The two sets of columns contain the results obtained, with the number of persons employed (columns 1 to 6) and the number of hours worked (columns 7 to 12) as alternative measures of dependent variable *L*.

The results from OLS and FE are reported together with those obtained with the Arellano and Bond First-Difference (FD) GMM estimator.[28] As a matter of fact, the dynamic panel data model (Eq. 3) calls for the adoption of an estimator that takes into account the endogeneity of the lagging dependent variable. A preliminary investigation confirms that the persistence of the labour market series at hand is not as severe as it could be when dealing with more developed economies, so we can stick to the use of the FD GMM estimator. Moreover, this choice allows us to limit the number of instruments to a minimum, following the rule of thumb that the number of instruments should always fall below the number of groups. Actually, the results reported in the tables confirm that the choice of the FD GMM estimator is a proper one, since the estimates of the coefficient associated with the autoregressive term lie consistently between the OLS and the FE ones. For comparison, we also report the results for the second step GMM estimator with the Windmeijer small sample correction in

28 M. Arellano, S. Bond: Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations, in: The Review of Economic Studies, Vol. 58, 1991, pp. 277-297.

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Table 6
Results – Total Sample

	Dep.variable *L*: persons employed						Dep.variable *L*: hours worked					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Variables	OLS	FE	GMM	GMM 2nd step	GMM	GMM 2nd step	OLS	FE	GMM	GMM 2nd step	GMM	GMM 2nd step
L_{t-1}	0.995***	0.744***	0.900***	0.896***	0.887***	0.880***	0.994***	0.733***	0.918***	0.882***	0.926***	0.922***
	(0.002)	(0.031)	(0.052)	(0.054)	(0.049)	(0.058)	(0.002)	(0.030)	(0.055)	(0.068)	(0.067)	(0.071)
w	0.003**	-0.142***	-0.182***	-0.260***	-0.193***	-0.248***	0.003*	-0.138***	-0.176***	-0.254***	-0.194***	-0.252***
	(0.001)	(0.021)	(0.064)	(0.074)	(0.064)	(0.068)	(0.001)	(0.022)	(0.064)	(0.071)	(0.072)	(0.081)
y	0.064***	0.196***	0.062	0.09	0.088*	0.084	0.063***	0.194***	0.04	0.066	0.032	0.04
	(0.009)	(0.027)	(0.054)	(0.070)	(0.051)	(0.065)	(0.009)	(0.028)	(0.053)	(0.066)	(0.065)	(0.069)
wp^{old}	-0.052***	-0.111**	0.026	0.068	0.013	0.052	-0.050***	-0.108**	0.044	0.118	0.104	0.075
	(0.012)	(0.052)	(0.086)	(0.100)	(0.166)	(0.167)	(0.012)	(0.054)	(0.078)	(0.096)	(0.193)	(0.196)
wp^{new}	0.037***	-0.040*	0.028	0.037	0.029	0.062	0.037***	-0.037	0.041	0.017	0.078	0.115
	(0.011)	(0.023)	(0.028)	(0.033)	(0.062)	(0.070)	(0.011)	(0.023)	(0.028)	(0.028)	(0.068)	(0.072)
Hansen-J			31.01	31.01	48.82	48.82			33.17	33.17	47.81	47.81
P-value			0.19	0.19	0.19	0.19			0.13	0.13	0.22	0.22
AR1			0	0	0	0			0	0	0	0
AR2			0.47	0.49	0.47	0.53			0.42	0.43	0.48	0.57
Instr-Nr			39	39	55	55			39	39	55	55
Obs.	650	650	585	585	585	585	650	650	585	585	585	585
Groups		65	65	65	65	65		65	65	65	65	65
R-squared	0.997	0.858					0.997	0.853				

Note: Robust Standard Errors in brackets *** p<0.01, ** p<0.05, * p<0.1.
Columns (3), (5), (9) and (11) report the results obtained with Arellano and Bond First-Difference GMM estimator.
Columns (4), (6), (10) and (12) report the results obtained with GMM second step estimator with the Windmeijer small sample correction.
Variables instrumented: Lt-1 , w and y in columns (3), (4), (9) and (10); Lt-1, w, y, wpold and wpnew in columns (5), (6), (11) and (12).

the tables (columns 4, 6, 10 and 12).[29] Columns 3, 4, 9 and 10 report the results obtained when wp^{old} and wp^{new} are treated as exogenous and only L_{t-1}, *w* and *y* are instrumented, while columns 5, 6, 11 and 12 refer to the specifications where wp^{old} and wp^{new} are instrumented together with L_{t-1}, *w* and *y*. Finally, each table reports the Hansen J-statistic, the P-values from the test for AR1 and AR2 in the disturbances from the differenced equation, the number of instruments used, the number of overall observations and cross-section units, and the R-squared for the OLS and the FE estimates.

The empirical settings employed here permit us to draw conclusions regarding the response of domestic employment in the NMS5 to domestic and foreign wage conditions. In the discussion, we shall pay major attention to more reliable GMM estimations. In general, the signs of estimated coefficients with respect to own wage w are in line with the theory, since the employment levels are negatively (and significantly) related to the value of wages paid in domestic sectors. The results obtained via two alternative measures of employment (persons engaged and number of hours worked) are comparable.

When the entire sample of sectors is considered (Table 6), there appears to be no statistically significant relationship between employment levels in the NMS5 and foreign wage conditions, regardless of whether

29 F. Windmeijer: A finite sample correction for the variance of linear efficient two-step GMM estimators, in: Journal of Econometrics, Vol. 126, No. 1, 2005, pp. 25-51.

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Table 7
Results – Manufacturing Only

	Dep.variable *L*: persons employed						Dep.variable *L*: hours worked					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Variables	OLS	FE	GMM	GMM 2nd step	GMM	GMM 2nd step	OLS	FE	GMM	GMM 2nd step	GMM	GMM 2nd step
L_{t-1}	0.994***	0.697***	0.919***	0.892***	0.843***	0.857***	0.994***	0.703***	0.977***	0.859***	0.897***	0.894***
	(0.002)	(0.033)	(0.103)	(0.073)	(0.063)	(0.069)	(0.002)	(0.032)	(0.119)	(0.098)	(0.083)	(0.077)
w	0.003*	-0.124***	-0.225**	-0.290***	-0.174**	-0.216**	0.002	-0.120***	-0.242**	-0.277***	-0.189***	-0.221***
	(0.002)	(0.021)	(0.086)	(0.103)	(0.066)	(0.089)	(0.001)	(0.022)	(0.091)	(0.092)	(0.071)	(0.067)
y	0.066***	0.220***	0.064	0.092	0.124**	0.103*	0.064***	0.211***	0.01	0.069	0.064	0.054
	(0.009)	(0.028)	(0.073)	(0.068)	(0.050)	(0.061)	(0.009)	(0.029)	(0.085)	(0.084)	(0.065)	(0.068)
wp^{old}	-0.056***	-0.125**	-0.031	0.03	-0.078	-0.061	-0.054***	-0.122**	0.014	0.125	0.008	-0.015
	(0.012)	(0.053)	(0.108)	(0.139)	(0.138)	(0.143)	(0.012)	(0.056)	(0.110)	(0.131)	(0.160)	(0.130)
wp^{new}	0.042***	-0.003	0.022	0.023	0.081	0.127*	0.041***	-0.006	0.023	0.001	0.102	0.149**
	(0.011)	(0.021)	(0.034)	(0.038)	(0.068)	(0.075)	(0.011)	(0.023)	(0.034)	(0.034)	(0.071)	(0.067)
Hansen-J			28.86	28.86	43.89	43.89			24.95	24.95	42.42	42.42
P-value			0.23	0.23	0.31	0.31			0.41	0.41	0.37	0.37
AR1			0	0	0	0			0	0	0	0
AR2			0.5	0.54	0.52	0.6			0.52	0.53	0.57	0.66
Instr-Nr			38	38	54	54			38	38	54	54
Obs.	600	600	540	540	540	540	600	600	540	540	540	540
Groups		60	60	60	60	60		60	60	60	60	60
R-squared	0.997	0.849					0.997	0.849				

Note: Robust Standard Errors in brackets *** p<0.01, ** p<0.05, * p<0.1.
Columns (3) , (5) , (9) and (11) report the results obtained with Arellano and Bond First-Difference GMM estimator.
Columns (4) , (6) , (10) and (12) report the results obtained with GMM second step estimator with the Windmeijer small sample correction.
Variables instrumented: L_{t-1}, *w* and *y* in columns (3), (4), (9) and (10); L_{t-1}, *w*, *y*, wp^{old} and wp^{new} in columns (5), (6), (11) and (12).

we consider wages paid in partner countries from the EU15 or those paid in partners belonging to the "new" countries. Only OLS and FE estimates give significant results, but the effect is very small and should be treated with caution due to endogeneity problems. A similar pattern is confirmed when we consider manufacturing sectors only (Table 7). However, an important difference emerges when we take into account the typology of sectors according to their level of skill intensity. Estimates obtained when only low skill-intensive sectors are considered (Table 8) point towards the possible substitution of the NMS5 labour force employed in such sectors with foreign workers employed in analogous sectors in partner countries from the EU15 group. Such a result proves that possible competition between NMS5 and EU15 labour may especially concern low skill-intensive types of manufacturing activity. The magnitude of East-West labour interdependency is considerable as, depending on the exact specification of the model, a 1% rise in wages in EU15 partner countries' low skill-intensive sectors can be related to as much as a 0.6% increase in the employment levels in these sectors in NMS5 economies (by extension, if wages in the EU15 fall by 1%, employment levels in the NMS5 drop by 0.6%). At the same time, there is no statistically robust evidence confirming competition within the NMS5.

Conclusions

Recent decades in Europe have been characterised by a dynamic process of East-West integration. Our study aims to fill the gap in research on the implications of trade integration in Europe on selected CEECs' labour

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Table 8
Results – Low Skill Intensive Sectors

	Dep.variable *L*: persons employed						Dep.variable *L*: hours worked					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Variables	OLS	FE	GMM	GMM	GMM	GMM	OLS	FE	GMM	GMM	GMM	GMM
				2nd step		2nd st.				2nd step		2nd step
L_{t-1}	0.993***	0.688***	0.940***	0.956***	0.884***	0.960***	0.993***	0.707***	0.957***	0.976***	0.904***	0.984***
	(0.002)	(0.052)	(0.105)	(0.094)	(0.087)	(0.143)	(0.002)	(0.052)	(0.117)	(0.127)	(0.108)	(0.145)
w	0.003*	-0.127***	-0.295***	-0.391***	-0.240**	-0.345***	0.003*	-0.125***	-0.268**	-0.358***	-0.224**	-0.268**
	(0.002)	(0.027)	(0.098)	(0.090)	(0.090)	(0.099)	(0.002)	(0.028)	(0.101)	(0.102)	(0.094)	(0.100)
y	0.094***	0.272***	0.231**	0.199***	0.230***	0.149	0.089***	0.253***	0.212**	0.155	0.199**	0.091
	(0.011)	(0.052)	(0.085)	(0.065)	(0.067)	(0.106)	(0.011)	(0.056)	(0.092)	(0.109)	(0.081)	(0.137)
wp^{old}	-0.024	0.008	0.259*	0.413***	0.368	0.485**	-0.015	0.034	0.285**	0.434***	0.484**	0.606***
	(0.029)	(0.086)	(0.148)	(0.129)	(0.243)	(0.218)	(0.029)	(0.088)	(0.119)	(0.138)	(0.229)	(0.197)
wp^{new}	0.016	-0.047*	-0.03	-0.044	-0.015	0.003	0.012	-0.058**	-0.019	-0.032	0.004	0.075
	(0.015)	(0.025)	(0.039)	(0.038)	(0.065)	(0.079)	(0.015)	(0.026)	(0.039)	(0.042)	(0.068)	(0.091)
Hansen-J			22.28	22.28	24.33	24.33			26.67	26.67	28.16	28.16
P-value			0.56	0.56	0.98	0.98			0.32	0.32	0.92	0.92
AR1			0	0.01	0	0.01			0	0.01	0.01	0.01
AR2			0.72	0.99	0.67	0.95			0.86	0.75	0.86	0.7
Instr-Nr			38	38	54	54			38	38	54	54
Obs.	400	400	360	360	360	360	400	400	360	360	360	360
Groups		40	40	40	40	40		40	40	40	40	40
R-squared	0.997	0.825					0.998	0.83				

Note: Robust Standard Errors in brackets *** p<0.01, ** p<0.05, * p<0.1.
Columns (3) , (5) , (9) and (11) report the results obtained with Arellano and Bond First-Difference GMM estimator.
Columns (4) , (6) , (10) and (12) report the results obtained with GMM second step estimator with the Windmeijer small sample correction.
Variables instrumented: L_{t-1}, *w* and *y* in columns (3), (4), (9) and (10); L_{t-1}, *w*, *y*, wp^{old} and wp^{new} in columns (5), (6), (11) and (12).

markets. Drawing on a dataset that matches industrial and trade statistics at the single-sector level, we estimate a conditional model of labour demand where the domestic demand for labour in the NMS5 is assumed to be affected not only by its own price but also by the labour costs in partner countries. Estimated elasticities allow us to detect potential complementarity/substitution relations concerning NMS5-based labour and workers employed in their partner countries.

General estimations that take all sectors into account do not prove a significant relationship between employment levels in the NMS5 and foreign wage conditions. The same is true when we eliminate the services sector from the sample. However, an important conclusion can be drawn when we take into account the specificity of manufacturing sectors according to their level of skill intensity. It turns out that within low skill-intensive sectors, domestic NMS5 labour shows a significant positive response to a rise in wage conditions in the same sectors in EU partner countries, in particular the EU15. In other words, when wages in partner countries from the EU15 rise in less demanding manufacturing sectors, employment levels in such sectors improve in the NMS5; the converse is true when wages in low skill-intensive EU15 sectors drop. This is a sign of substitution between workers employed in less advanced sectors in "new" EU countries and the EU15-based labour force. Such a result proves that the recent process of trade integration with Central and Eastern Europe has meant not only increased competition for the Western European labour force, but has also posed a challenge to workers employed in less skill-intensive sectors in NMS.

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