Research Report 403

JULY 2015

Migrants and Natives in EU Labour Markets:
Mobility and Job-Skill Mismatch Patterns

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Migrants and Natives in EU Labour Markets: Mobility and Job-Skill Mismatch Patterns

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Abstract

This paper presents a descriptive account of labour mobility across the EU economies. The focus of the paper is on different patterns between migrants ('foreign born') and natives with regard to mobility, exploring in particular the potential of migrants to 'grease the wheels' (Borjas, 2001) of labour markets by either themselves showing higher mobility rates or impacting on the mobility patterns of natives or existing migrants themselves. The main indicators examined are the gross mobility and net employment creation rates (GERR and NECR respectively) taken over from Davis and Haltiwanger (1992, 1999). This paper contains a descriptive assessment while a companion paper (Landesmann and Leitner, 2015) undertakes an econometric analysis of the determinants of mobility patterns. We differentiate between the EU-15 and the NMS-8 and further between sub-regions (OMS-North, OMS-South, NMS-Central, Baltics). We analyse differences in mobility patterns in OMS and NMS as regards age groups, skill groups, gender, length of job tenure, etc. Apart from overall labour market mobility we also examine inter-regional and inter-sectoral mobility. A second part of the analysis covers measures of 'job-skill (mis) matches', again with a focus of analysing differences between migrants and natives in this respect.

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Executive Summary

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MOBILITY PATTERNS

The first part of the paper attempts to present a comprehensive picture of labour mobility across the European Union between 2000 and 2011 with a *focus on distinct mobility patterns by native and migrant workers*. Mobility is analysed by means of two well-known indicators developed and proposed by Davis and Haltiwanger (1992, 1999): the *gross employment reallocation rate (GERR)* and the *net employment creation rate (NECR)*. Labour mobility is discussed across several different dimensions: changes in labour status (employed, unemployed or inactive), also broken down by different age cohorts and skill categories, inter-sector mobility as well as change of place of residence across EU regions i.e. mobility in and out of regions. Mobility patterns are compared over two different periods: the pre-crisis period (2000-2008) and the post-crisis period (2009-2011).

The following are the main results obtained by the analysis of mobility patterns:

› We distinguished between the two periods and also amongst a number of country groupings: EU-15 and NMS and then further sub-dividing these into EU(15)-Advanced and EU(15)-South; further, the NMS-5 and the NMS-Baltics.[1] We found *significant differences between migrants and natives* regarding gross labour turnover (GERR) in both periods for the EU-15 with migrants showing higher gross labour turnover than natives; this was also true for the sub-groups EU(15)-South and EU(15)-Advanced but amongst the NMS only for the Baltics. In terms of net employment gains/losses (NECR) migrants were much more hit by the recessions in the EU-South and the Baltics.

› As regards age cohorts we find generally high gross reallocation and net creation rates for the youngest age cohort (the 15-24 years old) and the oldest age cohort (the 55-64 years old). However, movements are quite different for the two groups: into employment for the youngest age cohort and out of employment for the oldest age group. As regards the other age group, gross labour mobility declines with age. The *generally higher mobility* – both in terms of GERR and NECR – *of migrants* amongst these age-cohorts are confirmed.

› With respect to labour mobility across skill groups, we find a clear pattern with the 'low educated' having the highest gross mobility followed by the 'middle educated' – those with completed secondary education – followed by the 'most highly educated' i.e. those with completed tertiary education. This pattern is observed both in the EU-15 and the NMS (and the sub-groups). Closer inspection of the data shows less of a difference between the 'middle' and the 'highly' educated and much stronger difference between both these groups and the 'low educated'. Interestingly, evidence suggests quite high net employment growth for the low educated both in the EU-15 and in the NMS. As regards *differences between migrants and natives*, we find higher labour mobility of migrants amongst the 'middle' and 'highly' educated but not amongst the 'low' educated. There are also marked differences between the sub-groups of countries, e.g. in the EU-South and the Baltics the relative employment

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[1]   See Annex for precise country grouping.

growth and contraction in the pre-crisis and crisis-periods was much higher for migrants than for natives, most likely to do with the construction boom and bust.

› As regards inter-sector mobility, we do find significantly higher inter-sectoral job mobility for migrants than for natives in the EU-15 but not amongst the NMS. This *higher inter-sectoral job mobility for migrants in the EU-15 shows up for all skill groups*. When we break this down by individual sectors, we find particularly high employment absorption of migrants in sectors such as hotels, finance, private households and public utilities such as electricity, gas, water.

› As regards inter-regional mobility, we find *significantly higher inter-regional mobility for migrants compared to natives in the agricultural, the manufacturing, tourism and other regions in the EU-15*; and *in the NMS it includes all the different types of regions* i.e. also the business services regions. This pattern also emerges by and large when we distinguish periods in which job destruction or job creation took place i.e. the *greater sensitivity of migrants compared to natives to job-destruction and job-creation* in these region types.

JOB-SKILL MISMATCHES

The second part of the paper draws a picture of the prevalence and extent *of job-skill mismatch of migrant and native workers* in different sectors (we analyse the manufacturing and tradable services sectors) in the European Union. Mismatch is captured as discrepancy between the required level of education for a particular job and the worker's educational attainment level. Furthermore, the analysis also differentiates migrant workers by country of origin (non-EU Europe and Developing) to demonstrate that a migrant's source country matters for observable job-skill mismatches. The analysis distinguishes in the first instances job-skill (mis)match patterns in the EU-15 and the NMS and, in a further analysis, goes more deeply into the analysis of differences amongst a sub-group of countries (AT, DE, DK, IT, SE, UK). The analysis is conducted throughout for the periods 2000-2008 (pre-crisis) and 2009-2011 (post-crisis).

The following are the main results obtained from the analysis of job-skill mismatch patterns between migrant and native workers:

› In general we find evidence of a **high degree of 'over-education' of migrants in 'low-occupation jobs'** (i.e. jobs in which a lower share of people with higher educational attainment levels is required) compared to natives. This is more the case in manufacturing than in the tradable services sector.

› There are also interesting developments over the crisis period compared to the pre-crisis period: **in the crisis period** we find even more evidence of migrants with high educational attainment levels taking jobs in 'low occupation' activities compared to natives. Furthermore, there is evidence of high-educated migrants moving out (relative to natives) of 'medium-occupation jobs' which might be interpreted as evidence of either becoming unemployed or further down-grading to 'low occupation jobs'.

› The extent of relative **'under-education' of migrants** (i.e. migrants taking up jobs for which they are less well qualified compared to natives) is much smaller than the extent of 'over-education' of migrants

discussed above. Nonetheless, this phenomenon also exists and we interpret this reflecting, on the one hand, the higher presence of migrants in e.g. managerial jobs in one-person or small companies compared to natives; and, on the other hand, which might be specifically important for migrants from advanced European countries in the NMS, that migrants might have certain **informally acquired skills** (e.g. through their experience of working in market economies for longer) without necessarily showing high formal educational attainment – which qualify them for jobs for which natives might have to show higher formal educational qualifications.

› If we compare the issue of 'over-education' between migrants from other European economies as compared to migrants from Developing Countries in EU labour markets we find a **much higher incidence of 'over-education' for migrants from Developing Countries**.

Regarding the more detailed country investigation, we find that the relatively high standards of general education in **Sweden and Denmark** lead to a particularly high presence of migrants in 'low occupation jobs'. **Germany** sticks out with overall no evidence for 'over-qualification' both in manufacturing and in tradable services which at closer examination seems to be due to the high share of migrants (measured in Germany by nationality thus representing strongly the recent waves of migration) coming from other European economies where the skill composition (by educational attainment levels) is rather similar to that of the natives; in fact regarding migrants from developing countries there is also in Germany strong evidence of 'over-qualification'. Finally, for the **UK** we find support for a more liberalised labour market regime which is associated with high competitive pressures leading to an erosion of a differential in qualification mis-matches of migrants vs. natives, while for **Italy** the mismatch (in terms of 'over-qualification') is particularly striking in manufacturing.

1   Introduction[2]

Labour mobility is an important topic in the European Union. The reasons for this are manifold. There is the well-rehearsed argument that compared to the United States, the European Union shows much lower mobility and this is seen as an important problem especially when happening in a currency Union; see the role of labour mobility in the literature on the Optimum Currency Area (see Mundell, 1961; McKinnon, 1963; Kenen, 1994; Eichengreen, 1991, Decressin and Fatás, 1995, etc.) The role of labour mobility as a vital mechanism of adjustment to asymmetric shocks in a currency union has been strongly emphasised in this literature and also been analysed empirically.

From an historical perspective, the mobility of workers within Europe has intensified significantly during the last two decades. First, because of the impact of the gradual implementation of the Single Market's four freedoms (together with some movement towards harmonisation of regulations, degree recognition, etc.) amongst the older members of the EU; secondly, as a result of the collapse of the Central and Eastern European communist bloc, the disruptions caused by transition including regional conflicts (such as in ex-Yugoslavia); and thirdly, because of the relaxation of restrictions on the movement of people and workers in the course of the EU enlargements in 2004 and 2007. The final transitional restrictions on the free mobility of workers from the new member countries to the EU-15 were lifted on 1 May 2011 for the countries which joined in 2004 and on January 1st 2014 for Bulgarians and Romanians; this might again have impacted on the patterns of workers and jobs mobility within the EU (Holland, 2011). However, the global financial crisis and the subsequent economic recession might have slowed down the flow of migrant workers from NMS-8, NMS-2[3] and non-EU countries due to the downturn in general labour demand.

The mobility of workers and jobs may contribute to a better matching of supply and demand on the labour market, and it can also serve the purpose of improving employment status, job position and making workers more competitive by adapting skills and competences to job market changes and technological progress. Theoretical and empirical studies have shown that the mobility of people and consequently mobility of workers can contribute to raise the flexibility to respond to sudden economic shocks that may hit an economy (see e.g. Pissarides, 2000 and Petrongolo and Pissarides, 2001). Neoclassical growth models and labour mobility studies see *migration* as the way in which a region adjusts to economic shocks (see e.g. Pissarides and Wadsworth, 1989; Brezzi and Piacentini, 2010; Blanchard and Katz, 1992; Partridge and Rickman, 2003, 2006; Mitze et al., 2012). The flow of labour migrants from low to high income per capita regions can contribute to the convergence of income levels across regions. Furthermore, considering that new labour mobility patterns in the EU are related to the growing demand for flexible labour, flexible working contracts (e.g. temporary rather than permanent

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[2]   The first three paragraphs of this introduction are common to this and the companion paper (see Landesmann and Leitner, 2015). This latter paper undertakes an econometric analysis of the determinants of job mobility in the European Union, again with a focus on differences in behaviour between migrants and natives, while the current paper is of a more descriptive nature and has an additional analysis on job-skill (mis) matches of migrants vs. natives.

[3]   NMS-8 refers to the first group of Central and Eastern European members which joined the EU in May 2004 and comprises Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia and NMS-2 refers to Bulgaria and Romania who joined in 2007.

jobs) and increasing numbers of job to job transitions, the role that temporary and circular migration might play in this new dynamics is crucial (Eurofound, 2011a). Thus, the mobility of migrant workers within EU countries and between EU and non-EU countries helps to counteract imbalances in labour supply and demand, thereby **'greasing the wheels' of labour markets** (see Borjas, 2001). Moreover, migrants are also found to perform an important function in that they contribute to productivity growth also in industries which have lower productivity (see Hierländer et al., 2010).

The analysis in this paper comprises two parts:

In the **first part**, a detailed picture is drawn of prevailing **worker mobility dynamics** of both native and migrant workers in the EU between 2000 and 2011. To capture labour mobility dynamics, the gross employment reallocation rate (GERR) as well as the net employment creation rate (NECR) as developed and proposed by Davis and Haltiwanger (1992, 1999) or Davis et al. (1996, 2006) are used as the two most important and widely accepted indicators of worker mobility. Labour mobility is analysed across several different dimensions: (i) changes in labour status (employed, unemployed or inactive), also broken down by different age cohorts and skill categories, (ii) change of place of residence across EU regions i.e. mobility in and out of regions and (iii) change of sector employment i.e. inter-sector mobility.

Generally, we shall distinguish the EU-15 as an important region of destination for migrant workers and the New Member States (NMS) as an important region of origin of migrant workers. We shall further sub-divide the EU-15 into an EU-South (comprising Greece, Italy, Portugal and Spain) which were particularly strongly hit by the recent economic crisis and the EU-Advanced (rest of the EU-15). Amongst the NMS, we shall distinguish the Central European economies (comprising Czech Republic, Hungary, Poland, Slovakia and Slovenia) and the Baltic States (Estonia, Latvia and Lithuania). The analysis covers the period 2000-2011 but we shall distinguish the pre-crisis period (2000-2008) and the post-crisis period (2009-2011) in order to account for differences in mobility patterns in the two periods.

In the **second part**, a detailed account is provided of differences in the prevalence and extent of **job-skill mismatches** between migrant and native workers in the EU between 2000 and 2011. The analysis uses the mismatch between the required level of education for a particular job, on the one hand, and the worker's educational attainment level, on the other, to identify job-skill mismatches and compares relative job-skill mismatches of migrant and native workers in the manufacturing and tradable services sectors. Furthermore, it differentiates migrant workers by country of origin (non-EU Europe and Developing) to demonstrate that migrant ethnicity matters for observable job-skill mismatches. We look at job-skill (mis)match patterns in two sectors of the economy (manufacturing and tradable services), distinguish again the situation in the EU-15 and the NMS, and analyse the pre-crisis (2000-2008) and post-crisis (2009-2011) periods separately. More detailed comparative analysis is undertaken for a sub-group of countries (AT, DE, DK, IT, SE, UK).

The rest of the paper is organised as follows: section 2 provides a brief discussion of the data used in the analysis. Section 3 gives a detailed account of patterns of labour mobility of migrant and native workers in the EU and analyses labour mobility in terms of changes in labour status also broken down by different age cohorts and skill categories, inter-sector mobility and inter-regional mobility. Section 4 then proceeds with a detailed discussion of job-skill mismatch patterns in the EU. Finally, section 5 summarises and concludes.

2   Data

The analysis uses the Eurostat Labour Force Survey (LFS) which is a large household sample survey that provides quarterly data on labour participation of persons aged 15 and over as well as of persons outside the labour force. The ensuing analysis, however, uses annual averages of quarterly data. The EU LFS is particularly suited for the analysis as it contains detailed information on demographic backgrounds of interviewees (like sex, year of birth, nationality, years of residence in a country or country of birth), their labour status, previous work experience, residence by region, level of education or job characteristics like occupation, industry etc. In particular, information on a person's level of education and current occupation are used to examine the prevalence of job-skill mismatches between migrant and native workers across sectors in the EU, where job-skill mismatches are defined as mismatches between the required level of education for a particular job and the worker's educational attainment level. Moreover, the EU LFS provides information on the situation of the interviewee a year prior to the interview (in terms of e.g. labour status, country and region of residence or industry code of the firm the interviewee worked the year before the survey). The latter information is crucial as it allows calculating worker flows between countries, regions and industries as well as between different types of labour status (i.e. from activity into inactivity and vice versa). Furthermore, with the information contained in the EU LFS, other types of worker flows can be identified like labour status related mobility rates differentiated by skill level or age.

All in all, a total of 23 EU-member countries is included in the analysis comprising Austria (AT), Belgium (BE), Bulgaria (BG), the Czech Republic (CZ), Germany (DE), Denmark (DK), Estonia (EE), Spain (ES), France (FR), Greece (GR), Hungary (HU), Italy (IT), Lithuania (LT), Luxembourg (LU), Latvia (LV), the Netherlands (NL), Poland (PL), Portugal (PT), Romania (RO), Sweden (SE), Slovenia (SI), Slovakia (SK) and the UK (UK).

3 PART 1: Patterns of labour mobility

3.1 RELATED LITERATURE

Partly dramatic increases in migration flows observable in many developed countries sparked interest in the economic consequences of immigration in host countries. However, while the main concern appears to be the impact of immigration on natives' wages and employment opportunities, following the seminal paper by Borjas (2001), a small body of literature points to immigrants' important contribution to economic efficiency in the operation of host country labour markets.[4]

Borjas (2001) shows that immigration 'greases the wheels' of the US labour market. In particular, given their higher sensitivity to interstate wage differentials and greater mobility across states, immigrants help to reduce prevailing interstate wage differentials, thereby greatly improving host countries' labour market efficiency. Similar evidence of the 'greasing of the wheels' effect of migration is found in a number of related studies (see e.g. Amuedo-Dorantes and de la Rica, 2005; Schündeln, 2007; Åslund, 2005; or Roed and Schone, 2012).

However, while there is consistent evidence of generally stronger responsiveness of migrants to employment and wage differences as well as of greater mobility, migrants' responsiveness and consequently the extent of the 'greasing of the wheels' effect strongly depends on additional factors like migrants' personal and demographic characteristics or the state of the host economy. In particular, the relative responsiveness and mobility of migrants tends to differ by country of origin and type of job. In this respect, Åslund (2005) addresses internal interregional migration in Sweden and shows that relative to Eastern European migrants, African migrants have a 30 percent higher migration probability while Middle Eastern migrants have an almost 50 percent higher migration probability. In contrast, Asian and South American migrants are between 30 and 40 percent less likely to migrate than their Eastern European counterparts. Likewise, Amuedo-Dorantes and de la Rica (2005) study the responsiveness of migrants and native workers to employment opportunities across Spanish regions, differentiating between indefinite, self-employment or informal employment opportunities. They show that while European immigrants are only slightly more responsive to higher employment probabilities in informal and in formal/indefinite employment, African and Latin-American immigrants demonstrate stronger responsiveness to regional employment opportunities in informal, self-employment as well as in formal/indefinite work. Similarly, evidence suggests that migrants' age matters for their responsiveness to labour market differentials. In their study on internal interstate migration patterns in Germany Schündeln (2007) demonstrates that younger migrants are generally more responsive to labour market differentials than older migrants, therefore more strongly greasing the wheel of labour markets. On the contrary, there is less consistent evidence that migrants' responsiveness and mobility decreases with their length of stay. In contrast to Borjas (2001), Amuedo-Dorantes and de la Rica (2005) fail to find any evidence of a significantly higher responsiveness of more recent immigrants relative to less recent ones.

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[4] Here, we only provide a short overview of the literature, for a more thorough discussion please refer to Landesmann and Leitner (2015b).

Furthermore, empirical evidence suggests that migrants' mobility responses in times of economic crises indeed help to shield native labour from negative effects of economic downturns or recessions. In this respect, Tani (2003) studies 161 European NUTS-2 regions of 12 EU-member states and finds that migrants indeed absorb some of the effects of a negative labour demand shock, thereby dampening the effect on natives. However, effects tend to differ across countries: while the effect is smaller in traditional immigration countries (like e.g. Germany, Denmark, the Benelux or the UK), it is particularly strong in recent immigration countries (like Greece, Italy, Spain, Portugal or Ireland). Similarly, Cedena and Kovak (2013) study mobility responses of native born US and foreign born workers to geographically differentiated labour demand shocks during the Great Recession and show that the responsiveness differs by level of skills: less skilled immigrants from Mexico respond more strongly than high-skilled native-born (male and female) workers.

3.2   METHODOLOGICAL APPROACH

Methodologically, the two most important indicators of worker mobility as developed and proposed by Davis and Haltiwanger (1992, 1999) or Davis et al. (1996, 2006) are used to measure labour mobility.

In particular, the ***gross employment reallocation rate (GERR)*** is defined as follows:

$$GERR_{i(j)} \equiv \frac{hired\ employees_{i(j)} + leaving\ employees_{i(j)}}{\frac{1}{2}(L_{i(j),t-1} + L_{i(j),t})}, \qquad (3.1)$$

while the ***net employment creation rate (NECR)*** is defined as follows:

$$NECR_{i(j)} \equiv \frac{hired\ employees_{i(j)} - leaving\ employees_{i(j)}}{\frac{1}{2}(L_{i(j),t-1} + L_{i(j),t})}. \qquad (3.2)$$

In this respect, $(hired\ employees + leaving\ employees)$ captures *gross* worker flows while $(hired\ employees - leaving\ employees)$ captures *net* worker flows and L_{t-1} and L_t refer to the stocks of labour of category i in period $t-1$ and t, respectively. Moreover, i refers to the mobility dimension which is either employment status, sector, or region while j refers to the type of worker considered, which is either 'domestic' for native workers or 'foreign' for migrant workers born outside the country of residence.

To draw the most comprehensive picture of labour mobility patterns in the EU, the analysis looks at the following different types and dimensions of labour mobility:

(a) **Employment status change**: as movements of workers from activity into inactivity and vice versa;

(b) **Employment status change by age categories**: as movements from activity into inactivity (and vice versa) of workers in the age cohorts 15-24, 25-34, 35-44, 45-54 and 55-64

(c) **Employment status change by skill category:** as movements of high-skilled (H), medium-skilled (M) and low-skilled (L) workers from activity into inactivity (and vice versa);

(d) **Across industries:** as movements of persons across industries, according to NACE Rev. 1 (until 2007) and NACE Rev. 2 from 2008 onwards; (also differentiated by skill categories: H, M and L)

(e) **In and out of regions:** as movements of persons in and out of the following six regions (based on NUTS-2 regional classification): agriculture (AGR), low-tech manufacturing (LTM), medium-high-tech manufacturing (MHM), business (BUS), tourism (TOU) and other (OTH). The capital region is included in the business region;

Moreover, given data availability, the analysis focuses on the period between 2000 and 2011, which is marked – over the later years - by the recent global economic and financial crisis. The financial crisis hit the global economy in 2008 and led to a strong disruption of national labour markets which resulted in partly dramatic surges in unemployment - particularly among the younger age cohorts – and potentially stronger movements of workers across jobs, industries or in and out of regions.

Hence, in order to account for the effects of the recent crisis, labour mobility dynamics are analysed separately for the pre-crisis period (2000-2008) and the post-crisis period (2009-2011). However, since some countries (like the Baltics or Southern European economies) were more strongly affected by the crisis, the pre- and post-crisis labour mobility dynamics are studied for the EU-15 and the NMS separately but also for four different country sub-groups. In particular, the EU-15 is further sub-divided into:

› the **EU-South** comprising Greece, Italy, Portugal and Spain and

› the **EU-Advanced** comprising Austria, Belgium, Germany, Denmark, France, Sweden and the UK.

Furthermore, the group of NMS is sub-divided into:

› the **Central European economies** (NMS-5) comprising the Czech Republic, Hungary, Poland, Slovakia and Slovenia and

› the **Baltic states** (NMS-Baltics) comprising Estonia, Latvia and Lithuania.

3.3   FINDINGS

In what follows, some description of mobility patterns using the two types of mobility indicators, GERR and NECR defined in (3.1) and (3.2) above, respectively, is provided where we distinguish between migrants and natives as well as between 2 periods, 2000-2008 as the pre-crisis period and 2009-2011 as the post-crisis period.

Figure 1 depicts gross employment reallocation rates (GERR) for different country groups to capture movements of workers in and out of employment. It points to **significant differences between migrants and natives** regarding gross labour turnover in both periods for the EU-15 with, however, migrants showing higher reallocation rates than natives. This was also true for the two sub-groups EU(15)-South and EU(15)-Advanced but not or much less for the NMS. In fact, Annex Figure 1 which provides gross employment reallocation rates of migrants and natives by individual countries shows that

this is true for all countries included in the sub-groups EU-South and EU-Advanced. In contrast, higher reallocation rates for migrants than for natives only show up for some NMS-5 countries, namely the Czech Republic, Poland and Slovakia. In terms of net employment gains or losses – as captured by the NECR indicator - Figure 2 shows that migrants were much more hit by the recession than natives in the EU-South and the Baltics over the 2009-2011 period. Annex Figure 2 shows that in the EU-South, the effect of the recession on migrants' net employment losses were most substantial in Spain and Greece. On the contrary, employment losses of migrants were almost equally dramatic in all three Baltic countries.

Figure 1 / Status change: gross employment reallocation rates (GERR), by country group
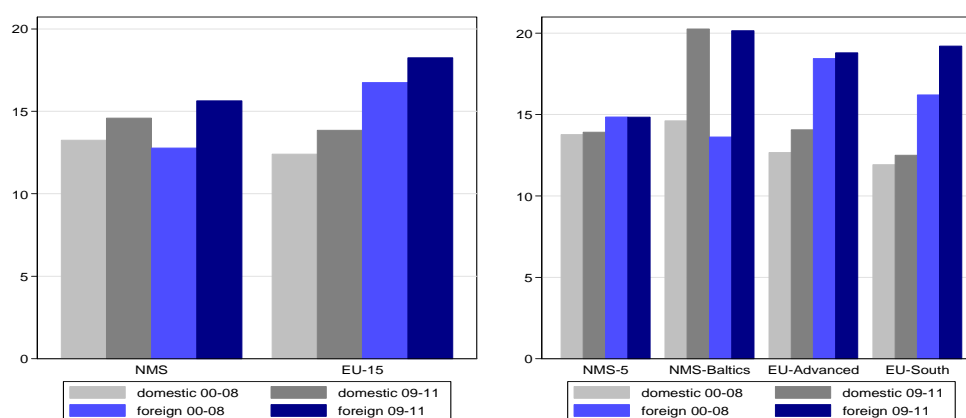
Source: LFS, own calculations

Note: NMS-5 comprises the Czech Republic, Hungary, Poland, Slovenia and Slovakia; NMS-Baltics comprises Estonia, Latvia and Lithuania; EU-Advanced comprises Austria, Belgium, Denmark, France, Germany, Sweden and the UK while EU-South comprises Greece, Italy, Portugal and Spain.

Figure 2 / Status change: net employment creation rates (NECR), by country group

Source: LFS, own calculations

Note: NMS-5 comprises the Czech Republic, Hungary, Poland, Slovenia and Slovakia; NMS-Baltics comprises Estonia, Latvia and Lithuania; EU-Advanced comprises Austria, Belgium, Denmark, France, Germany, Sweden and the UK while EU-South comprises Greece, Italy, Portugal and Spain.
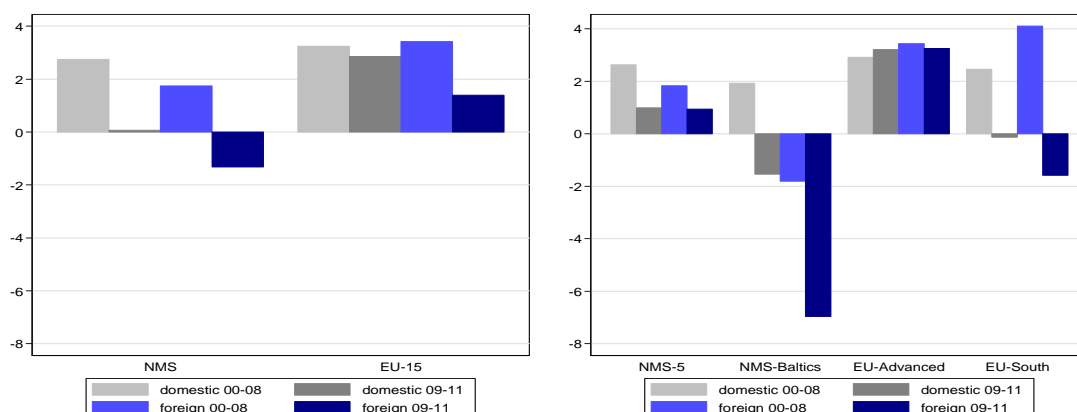
Figure 3 / Status change: gross employment reallocation rates, by country group and age

Source: LFS, own calculations
Note: NMS-5 comprises the Czech Republic, Hungary, Poland, Slovenia and Slovakia; NMS-Baltics comprises Estonia, Latvia and Lithuania; EU-Advanced comprises Austria, Belgium, Denmark, France, Germany, Sweden and the UK while EU-South comprises Greece, Italy, Portugal and Spain.

Figure 4 / Status change: net employment creation rates, by country group and age
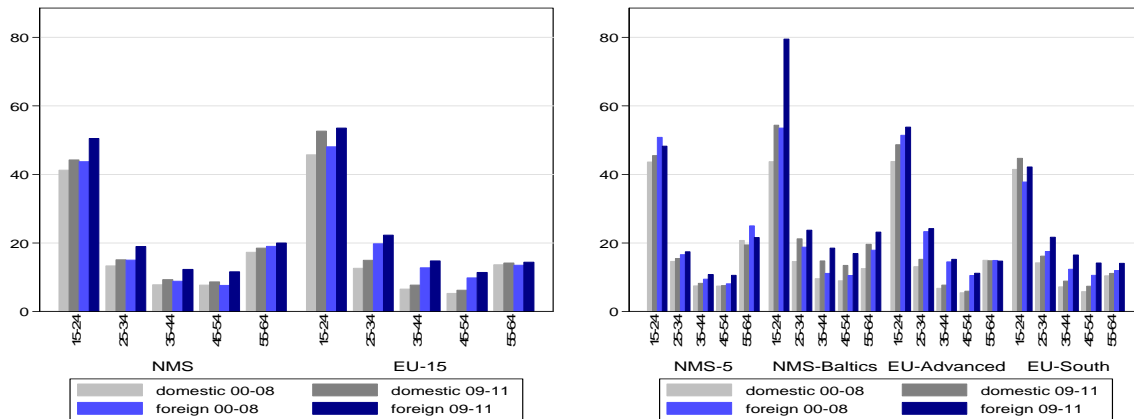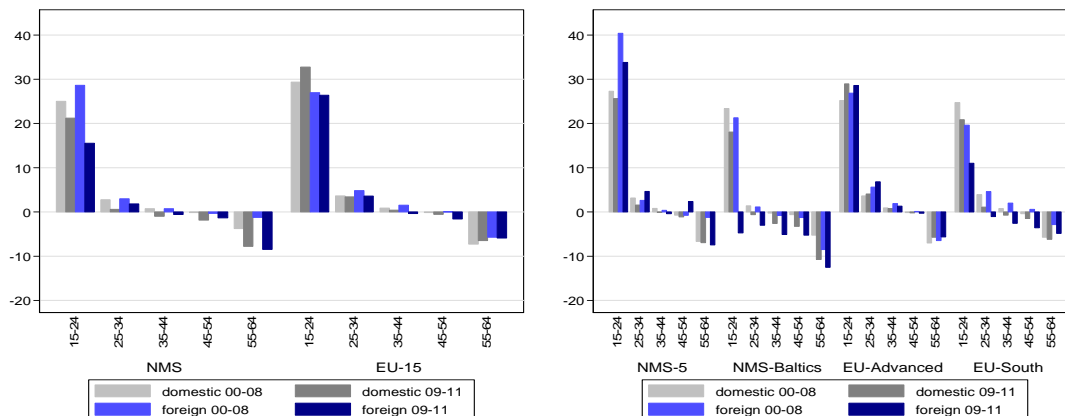

Source: LFS, own calculations
Note: NMS-5 comprises the Czech Republic, Hungary, Poland, Slovenia and Slovakia; NMS-Baltics comprises Estonia, Latvia and Lithuania; EU-Advanced comprises Austria, Belgium, Denmark, France, Germany, Sweden and the UK while EU-South comprises Greece, Italy, Portugal and Spain.

Furthermore, as regards age-specific mobility patterns (see Figure 3 and Figure 4), we generally find that both gross employment reallocation and net employment creation are high for the youngest age cohort (the 15-24 years old) and the oldest age cohort (the 55-64 years old) in the labour force.[5] However, patterns on net employment creation (NECR) depicted in Figure 4 confirm that movements are quite different for the two age groups: into employment for the youngest age cohort and out of employment for the oldest age group (see also Annex Figure 4 for evidence on individual countries). As regards the other age cohorts, ***gross labour mobility declines with age***: the 25-34 age cohort shows greater mobility than the 35-44 age cohort which again shows higher labour mobility than the 45-54 age cohort. This is true both in the pre-crisis boom period in terms of positive employment experience as well

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5   These general patterns are also observable at the level of each individual country included in the sample
     (see Annex Figure 3).

as during the crisis period in terms of negative employment growth. The ***generally higher mobility*** –
both in terms of GERR and NECR – ***of migrants*** amongst these age-cohorts are confirmed.

Figure 5 / Status change: gross employment reallocation rates, by country group and skill-groups
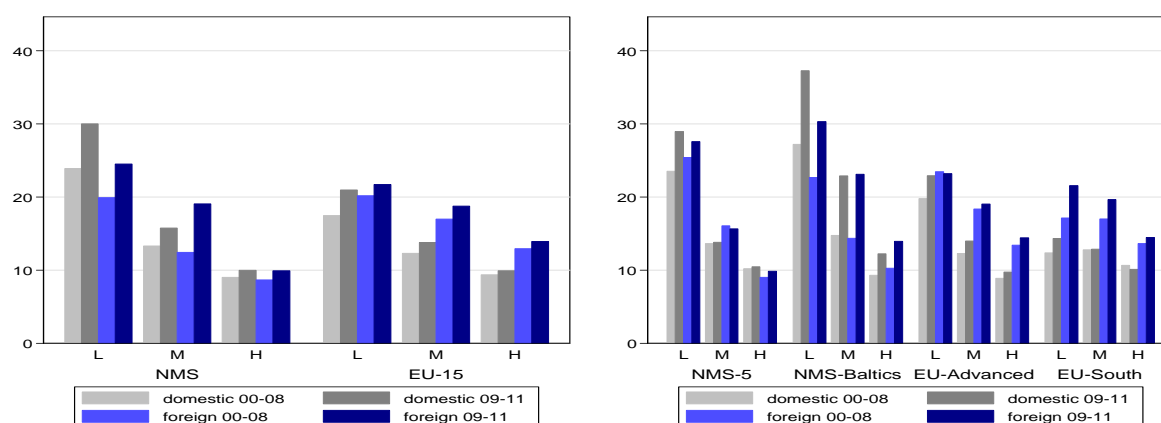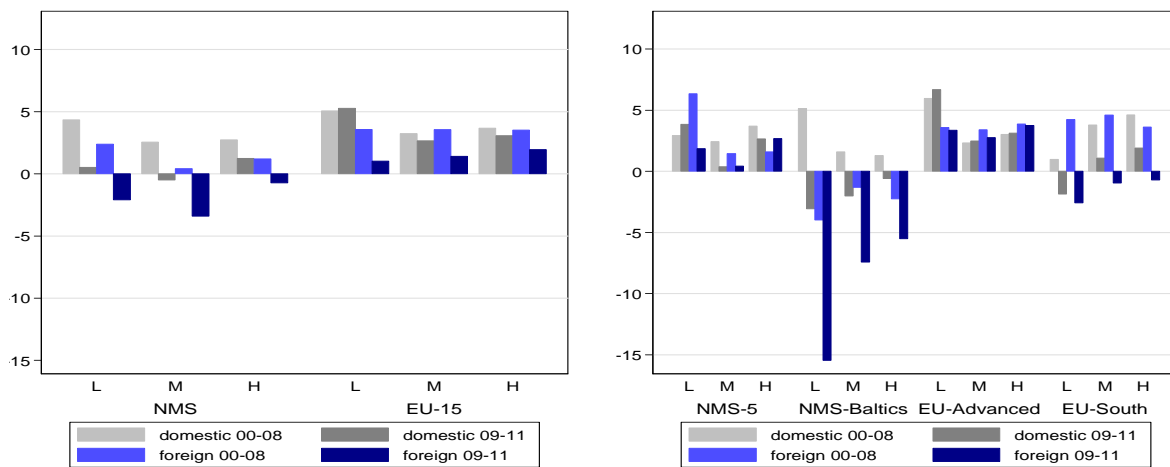

Source: LFS, own calculations
Note: NMS-5 comprises the Czech Republic, Hungary, Poland, Slovenia and Slovakia; NMS-Baltics comprises Estonia,
Latvia and Lithuania; EU-Advanced comprises Austria, Belgium, Denmark, France, Germany, Sweden and the UK while
EU-South comprises Greece, Italy, Portugal and Spain. L refers to low-educated, M to medium-educated and H to high-educated.

Moreover, with respect to labour mobility across skill groups, which we capture by educational
attainment, we find a clear pattern with the ***'low educated' having the highest gross mobility*** followed
by the 'middle educated' – those with completed secondary education – followed by the 'most highly
educated' i.e. those with completed tertiary education (see Figure 5). This pattern is observed both in the
EU-15 and the NMS (and the sub-groups as well as in individual countries (see Annex Figure 5)). Closer
inspection of the data shows – at least for the pre-crisis period - less of a difference between the 'middle'
and the 'highly' educated and much stronger differences of both these groups and the 'low educated'.
Interestingly, evidence suggests quite high relative net employment growth (NECR) for the low educated
amongst the natives both in the EU-Advanced and in the NMS-5 (see Figure 6). In the EU-Advanced,
this is particularly true for Germany, Austria and Denmark and less so for Sweden while in the NMS-5,
this is particularly true for Slovakia and Poland (see Annex Figure 6). Further, regarding ***differences
between migrants and natives***, we find ***higher labour mobility of migrants in the 'middle' and
'highly' educated but not amongst the 'low' educated***. There are also marked differences between
the sub-groups of countries: in the EU-South and the Baltics the relative employment growth and
contraction in the pre-crisis and crisis-periods was much higher for migrants than for natives, most likely
to do with the construction boom and bust.

Figure 6 / Status change: net employment creation rates, by country group and skill-groups

Source: LFS, own calculations
Note: NMS-5 comprises the Czech Republic, Hungary, Poland, Slovenia and Slovakia; NMS-Baltics comprises Estonia, Latvia and Lithuania; EU-Advanced comprises Austria, Belgium, Denmark, France, Germany, Sweden and the UK while EU-South comprises Greece, Italy, Portugal and Spain. L refers to low-educated, M to medium-educated and H to high-educated.

Patterns of *inter-sector mobility* (which was measured by GERR at the NACE 1-digit level; a more detailed sectoral classification could not be used for a sufficient number of countries) are depicted in Figure 7 and Figure 8. We do find significantly higher inter-sectoral job mobility for migrants than for natives in the EU-15 (and the two country sub-groups) but not amongst the NMS (Figure 7). However, Annex Figure 7 points at a more heterogeneous picture and demonstrates that this is not the case for all individual EU-15 or NMS countries. In particular, in France and Sweden, inter-sectoral job mobility for migrants is either at par or slightly lower than for natives. Similarly, in Slovakia and less so in Lithuania, inter-sectoral job mobility for migrants is actually higher than for natives.

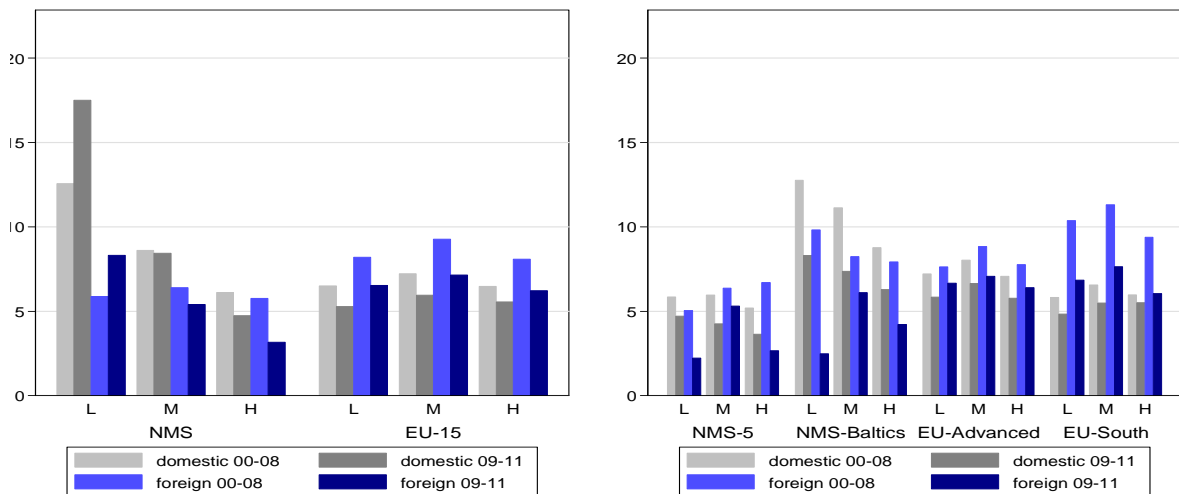**Figure 7 / Inter-sectoral mobility: gross employment reallocation rates, by country group**
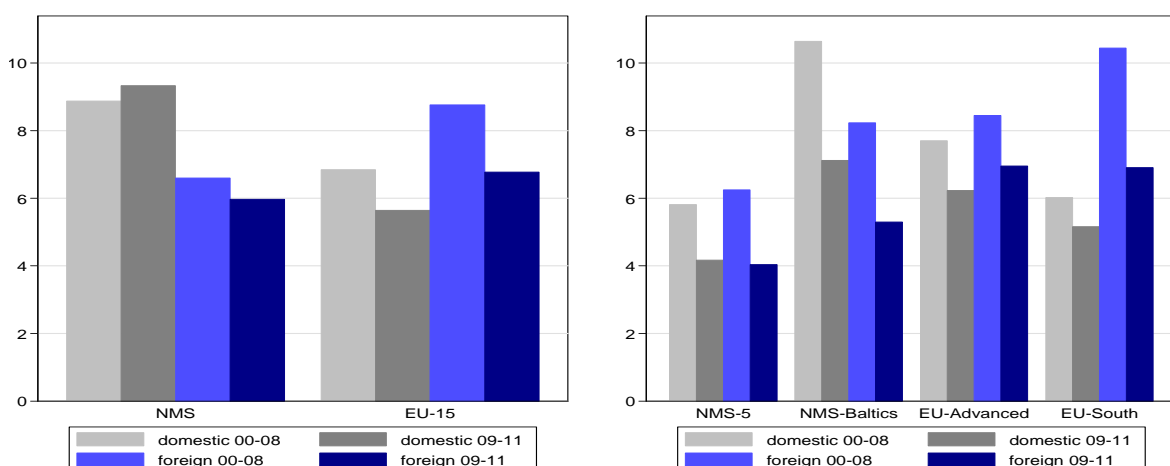
Source: LFS, own calculations
Note: NMS-5 comprises the Czech Republic, Hungary, Poland, Slovenia and Slovakia; NMS-Baltics comprises Estonia, Latvia and Lithuania; EU-Advanced comprises Austria, Belgium, Denmark, France, Germany, Sweden and the UK while EU-South comprises Greece, Italy, Portugal and Spain.

Moreover, the ***higher inter-sectoral job mobility for migrants in the EU-15 shows up for all skill groups*** (Figure 8) (and rather consistently also for all individual EU-15 countries (see Annex Figure 8)). When this is further broken down by individual sectors, we find particularly high employment absorption of migrants in sectors such as hotels, finance, private households and public utilities such as electricity, gas and water (not shown separately).

Figure 8 / Inter-sectoral mobility: gross employment reallocation rates, by country group and skill groups

Source: LFS, own calculations
Note: NMS-5 comprises the Czech Republic, Hungary, Poland, Slovenia and Slovakia; NMS-Baltics comprises Estonia, Latvia and Lithuania; EU-Advanced comprises Austria, Belgium, Denmark, France, Germany, Sweden and the UK while EU-South comprises Greece, Italy, Portugal and Spain. L refers to low-educated, M to medium-educated and H to high-educated.

Figure 9 / Regional mobility: gross employment reallocation rates, by country group
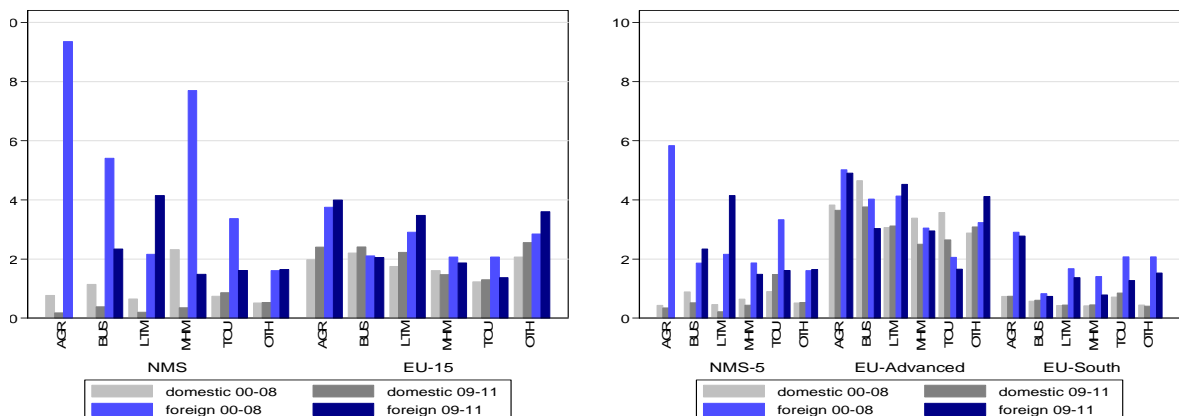
Source: LFS, own calculations
Note: AGR refers to agriculture, BUS to business, LTM to low-tech manufacturing, MHM to medium-high-tech manufacturing, TOU to tourism and OTH to other. The capital region is included in the business region; NMS-5 comprises the Czech Republic, Hungary, Poland, Slovenia and Slovakia; EU-Advanced comprises Austria, Belgium, Denmark, France, Germany, Sweden and the UK while EU-South comprises Greece, Italy, Portugal and Spain.

Finally, as concerns **mobility in and out of regions** (see Figure 9) we find **significantly higher regional mobility for migrants compared to natives, particularly in the agricultural, the manufacturing, tourism and other regions in the EU-15**. **In the NMS it includes all the different types of regions** i.e. also the business services regions[6]. These differentiated mobility patterns are also observable at the individual country level (see Annex Figure 9). Furthermore, this pattern also emerges by and large when we distinguish periods in which job destruction or job creation took place (see Figure 10), pointing to the **greater sensitivity of migrants compared to natives to job-destruction and job-creation** in these region types.

Figure 10 / Regional mobility: employment creation and destruction rates, by country group
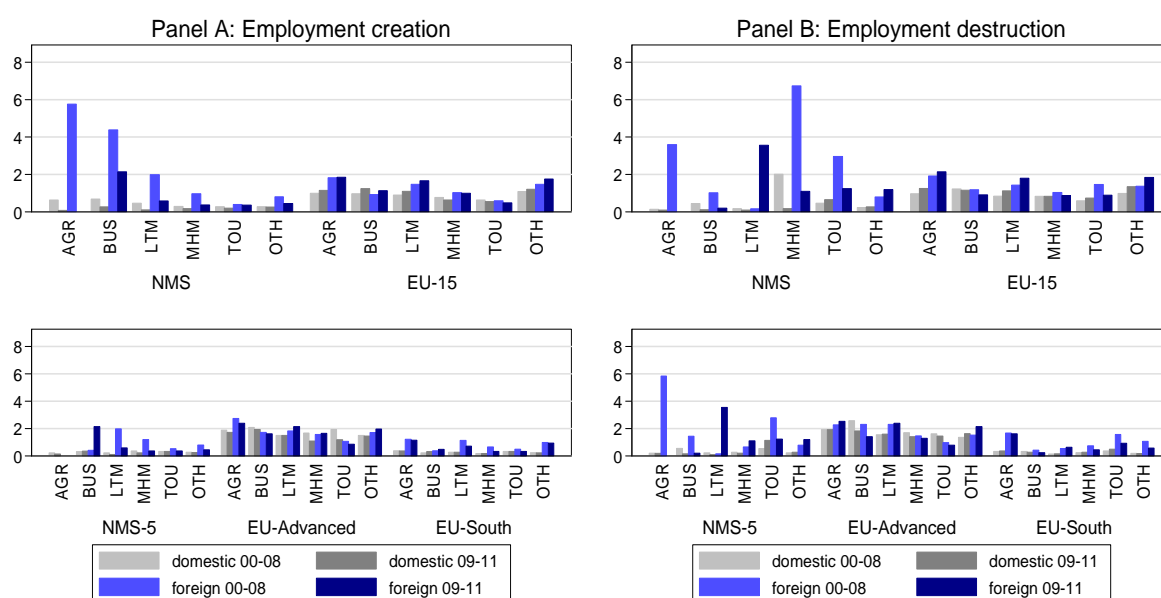

Source: LFS, own calculations
Note: AGR refers to agriculture, BUS to business, LTM to low-tech manufacturing, MHM to medium-high-tech manufacturing, TOU to tourism and OTH to other. The capital region is included in the business region; NMS-5 comprises the Czech Republic, Hungary, Poland, Slovenia and Slovakia; EU-Advanced comprises Austria, Belgium, Denmark, France, Germany, Sweden and the UK while EU-South comprises Greece, Italy, Portugal and Spain.

Furthermore, Figure 11 gives a summary account of inter-regional mobility of migrants and natives when (in-and-out-of) regions' mobility is aggregated across the region types with regional employment shares used as weights. Again, we see significantly higher overall inter-regional mobility for migrants in the NMS economies (restricted to NMS-5 as the Baltic states have too few NUTS 2 regions to conduct this type of analysis) and the EU-South, with a much smaller difference between migrants and natives for the EU-advanced economies, however.

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[6] We should mention here that international mobility of migrants into a region is included in the calculation of the inter-regional mobility indicator (i.e. of migrants who have not been in the country in t-1). This is also the case for the calculation of inter-sectoral mobility indicators discussed earlier. However, in both cases, the inclusion of migrants which have not been in the country in t-1 is legitimate if the focus is on their role in the 'greasing of the wheels' of the labour market.

Figure 11 / Regional mobility: country-level gross employment reallocation rates (weighted by relative weights of each region)
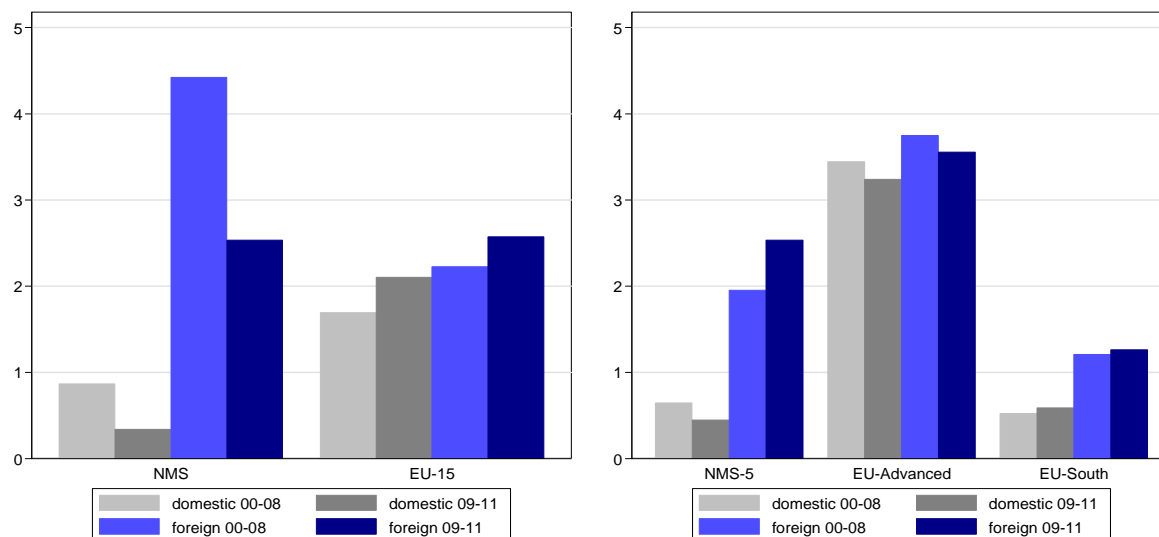
Source: LFS, own calculations

Note: NMS-5 comprises the Czech Republic, Hungary, Poland, Slovenia and Slovakia; NMS-Baltics comprises Estonia, Latvia and Lithuania; EU-Advanced comprises Austria, Belgium, Denmark, France, Germany, Sweden and the UK while EU-South comprises Greece, Italy, Portugal and Spain.

4   PART 2: Job-skill mismatch of migrant and native workers

In this part of the paper, we focus on differences in the incidence and extent of 'job-skill mismatch' between migrant and native workers in the European Union. We shall distinguish the pre-crisis and crisis periods and also look at differences in job-skill mismatches in two important sectors of the economy (manufacturing and tradable services) and at country differences within the European Union.

4.1   RELATED LITERATURE

The literature on skill-job mismatch among migrant workers is still limited but has continuously been growing, particularly over the last two decades.[7] In this particular strand of literature, **over-education** has received much attention due to its prevalence, extent and persistence but, more importantly, due to the important issues it raises. In particular, over-education is a serious form of '**brain waste**', namely the underutilisation of migrant education and skills in the host country, and has detrimental wage effects for those that are affected since their returns to education are lower than for workers that are correctly matched.

In general, most studies point to a higher incidence of job-skill mismatch among migrants than among natives. The incidence of **under-education** is generally rather low. For instance, Lindley and Lenton (2006) using data for the UK find that the incidence of under-education among male and female immigrants is only 19 percent while that of natives is between 26 and 33 percent. Likewise, Tijdens and van Klaveren (2011) estimate mismatch incidence rates for 13 different EU-15 countries separately and show that the incidence of under-education is even lower and between 1 and 13 percent only. Their results again point to differences across migrants and natives and seem to suggest that under-education tends to be less pronounced among migrants than among natives. On the contrary, the percentage of **correctly matched** migrants and natives is rather high, ranging between 40 up to 80 percent with partly marked differences across migrants and natives and no clear pattern as to whether matching is better among migrants or natives (see, e.g., Piracha and Vadean (2012) for an overview). Relative to under-education, the incidence of **over-education** is a more prevalent phenomenon and tends to be stronger among migrants than natives. This is generally explained with imperfect transferability of human capital (Chiswick and Miller, 2009), lack of innate ability (Sicherman and Galor, 1990), lower quality of foreign schooling or systematic labour market discrimination. For instance, using data for Spain, Sanromá et al. (2008) show that while the incidence of over-education is around 36 percent for migrant workers, it only reaches 28 percent for native workers. More spectacularly, Lindley and Lenton (2006) using data for the UK find that with 63 percent, the over-education of immigrants is almost twice as high as that of male natives (with 37 percent) while Fernandez and Ortega (2006) highlight that with almost 38 percent, the

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[7]   See, e.g., Battu and Sloane (2004), Campell (2013) and Lindley and Lenton (2006) for the UK, Green et al. (2007), Kler (2007), Messinis (2007) or Wen and Maani (2014) for Australia, Fernandez and Ortega (2006) or Sanroma et al. (2008) for Spain, Poot and Stillman (2010) for New Zealand, Nielsen (2011) for Denmark, Joona et al. (2007) for Sweden or Nieto et al. (2013) and Tijdens and van Klaveren (2011) for a set of EU countries.

incidence of over-education observable among migrants is almost three times higher than the one for native workers (with around 15 percent).

Furthermore, the literature highlights that the scale of mismatch strongly depends on additional factors like migrants' countries of origin, host country labour markets or migrants' characteristics and background.[8] For instance, Battu and Sloane (2004) show for the UK that the incidence of over-education differs by *country of origin* and is highest for Indians, African-Asians and Pakistanis (with almost 40 percent), followed by Bangladeshis (with 33 percent) and finally Chinese and Caribbeans with only around 30 percent – which is similar to the incidence of over-education among natives. Similarly, Nieto et al. (2013) highlight that immigrants in the EU from outside the EU have a higher incidence of over-education than those from within the EU, namely 35 and 31 percent, respectively, while Tijdens and van Klaveren (2011) show that in the EU-27 a migrant's country of origin matters a lot for his or her incidence of over-education: migrants from Asia and Latin America show the highest incidence of over-education (with around 30 percent), followed by migrants from Africa (with 25 percent) and migrants from the US, Canada or Australia with only 17 percent.

The literature also suggests that migrants' characteristics and background matter greatly for the extent of job-skill mismatch. In this respect, matching is significantly better for migrants from countries with a *similar language* to that of the host country. Both Green et al. (2007) and Wen and Maani (2014) using different survey data for Australia emphasise that English-speaking migrants have up to a 10 percentage points lower incidence of over-education than non-English-speaking migrants. Similarly, a person's *gender* plays a non-negligible role for the observable level of mismatch. Using several censuses for New Zealand, Poot and Stillman (2010) point to substantial differences in over-education rates between male and female recent and earlier migrants and demonstrate that recent female migrants had an around 6 percentage points higher over-education rate than their male counterparts. Similar patterns are identified for the group of second generation male and female Greeks and Italians in Australia by Messinis (2007), again putting female migrants at a disadvantage. Moreover, the observable level of mismatch also strongly depends on the migrant's *length of stay*. For instance, using data on earlier and recent immigrants to New Zealand, Poot and Stillman (2010) demonstrate that recent immigrants have a substantially higher incidence of over-education. In particular, they show that recent immigrants have a between 10 to 12 percentage points higher incidence of over-education than earlier immigrants to New Zealand. Furthermore, the incidence of over-education is also strongly affected by the immigrant's *host country qualifications*. In this respect, using data from Danish administrative registers, Nielsen (2011) shows that relative to both native Danes and immigrants educated in Denmark, foreign-educated immigrants have a higher likelihood of being over-educated. In particular, foreign-educated immigrants have a 47 percent higher level of over-education, followed by 40 percent for Danish-educated immigrants and by 33 percent for native Danes.

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[8] Furthermore, results differ by the particular methodological approach used. For instance, in their review article, Leuven and Oosterbeek (2010) point out that the self-assessment and job analysis methods do not lead to large differences in estimated mismatch incidences but that the realised matches procedure tends to lead to lower estimated levels of over-education.

4.2   METHODOLOGICAL APPROACH

Generally, job-skill mismatch is defined as mismatch between the required level of education for a particular job, on the one hand, and the worker's educational attainment level, on the other. More specifically, there is 'over-education' if workers' skills exceed their job qualification requirements, 'under-education' if workers' skills fall short of their job qualification requirements but 'correct qualification' if workers' skills match their job qualification requirements.

$$Skill\ mismatch = \begin{cases} \boldsymbol{Over-educated} & if\ job\ qualification\ requirements < skills \\ \boldsymbol{Correctly\ matched} & if\ job\ qualification\ requirements = skills \\ \boldsymbol{Under-educated} & if\ job\ qualification\ requirements > skills \end{cases}$$

For the ensuing analysis, information on occupations as contained in the EU Labour Force Surveys (LFS) is used to identify **job qualification requirements**. More specifically, the LFS provides information on the occupation a person is employed in by ISCO categories (International Standard Classification of Occupations). These occupations range from 0 to 9, but for the purpose of the analysis, following Huber et al. (2009) they were grouped together into three different job types: (i) occupations 1 to 3 were grouped into a 'high occupation job type' (OccHigh), (ii) occupations 4 to 8 into a 'medium-occupation job type' (OccMedium) while (iii) occupation 9 are referred to as 'low-occupation job type' (OccLow) (see Table 1). Given difficulties in distinguishing between various different skill positions in occupation group 0 (i.e. armed forces), it was dropped from the analysis. The resulting loss of information is, however, rather minor as only a very small fraction of people is employed in these types of jobs.

Table 1 / Correspondence between major job groups (ISCO) and required skill levels (ISCED)

Major ISCO groups	Job types (ISCO-based)	Educational attainment levels (Skills)
1. Legislators, senior officials and managers	OccHigh	SkHigh (ISCED 5,6)
2. Professionals	OccHigh	SkHigh (ISCED 5,6)
3. Technicians and associate professionals	OccHigh	SkHigh (ISCED 5,6)
4. Clerks	OccMedium	SkMedium (ISCED 3,4)
5. Service workers and shop and market sales workers	OccMedium	SkMedium (ISCED 3,4)
6. Skilled agricultural and fishery workers	OccMedium	SkMedium (ISCED 3,4)
7. Craft and related trade workers	OccMedium	SkMedium (ISCED 3,4)
8. Plant and machine operators and assemblers	OccMedium	SkMedium (ISCED 3,4)
9. Elementary Occupations	OccLow	SkLow (ISCED 0,1,2)
0. Armed forces	No assignment	

Source: Huber et al. (2009)

Furthermore, **skills** are identified by workers' educational attainment levels, based on the ISCED classification (International Standard Classification of Education), which ranges between 0 and 6. To ensure comparability and compatibility with job types, ISCED categories were grouped into three different skill groups: (i) 'high-skilled' (SkHigh) for ISCED levels 5 and 6, (ii) 'medium-skilled' (SkMedium) for ISCED levels 3 and 4 and (iii) 'low-skilled' (SkLow) for ISCED levels 0, 1 and 2 (see Table 1 for the

relationship between job types and skill levels). One shortcoming of this skill indicator is, however, that it captures formal training activities only but neglects informal education (like learning-by-doing, on the job training, etc.). Furthermore, we have the well-known problem that the classification by formal educational (ISCED) levels cannot account for any differences in the 'quality' of education or training received at these levels in different economies and, furthermore, whether education received in different countries are more or less easily transferable across countries. Indeed, these differences can account for some of the 'over-education' or 'under-education' of migrants vs. natives measured below.

Methodologically, the analysis follows Landesmann et al. (2010) to identify differences in the prevalence and extent of job-skill mismatch across sectors between migrant and native workers. In particular, the following step-wise approach is taken: first, the three different job types (occLow, occMed and occHigh) are identified by sector and country; second, for each job type, the shares of high, medium and low-skilled workers in the employed labour force are calculated, separately for migrant and native workers. Hence, the share of correctly qualified, over- or underqualified migrant and native workers are identified for each job-type separately. Hence e.g. the over-qualified share of migrants with the highest educational attainment levels (SkHigh) in a particular job would be the share of migrant employees who have such an educational level beyond that of all employees (migrants and natives) in this particular job. An incidence of 'under-qualification' would then be if the migrant work-force would show a lower share of higher-educational attainment levels than would be the case for the entire work-force in a particular job.

Coming to notation, $ShareMig_{ijkt}^{S}$ refers to the share of migrants of skill-type s in job type k in sector i, in country j at time t in the total migrant labor force in job type k in sector i, in country j at time t (see equation (4.1)). Similarly, $ShareDom_{ijkt}^{S}$ refers to the share of natives of skill-type s in job type k in sector i, in country j at time t in the total native labor force in job type k in sector i, in country j at time t (see equation (4.2)).

$$ShareMig_{ijkt}^{S} = \frac{\# \, of \, migrants_{ijkt}^{S}}{total \, \# \, of \, migrants_{ijkt}} * 100 \qquad (4.1)$$

$$ShareDom_{ijkt}^{S} = \frac{\# \, of \, natives_{ijkt}^{S}}{total \, \# \, of \, natives_{ijkt}} * 100 \qquad (4.2)$$

Then, the relative job-skill mismatch indicator between migrant and native workers would be derived by skill type, and defined as follows:

$$\frac{ShareMig_{ijkt}^{S}}{ShareDom_{ijkt}^{S}} - 1 \qquad (4.3)$$

i.e. the ratio between the share of migrants of skill-group s in job type k in sector i, in country j at time t and the share of natives of skill-group s in job type k in sector i, in country j at time t. As such, it captures whether, in a particular job type, correctly qualified, over- or under-qualified migrant workers are equally represented, over- or under-represented relative to native workers. Furthermore, one is deducted from the ratio to centre the relative mismatch indicator around zero. In this respect, a positive mismatch indicator refers to a situation where, relative to their native counterparts, migrants of a particular skill-type in a particular job type are over-represented while a negative mismatch indicator describes the opposite, an under-representation of migrant workers of a particular skill-type in a particular job relative to native workers.

Furthermore, based on previous empirical findings on job-skill mismatch which stresses that the incidence of over-education is strongly related to a migrant worker's country of origin (see, e.g., Battu and Sloane, 2004; Nieto et al., 2013; Tijdens and van Klaveren, 2011), the analysis will also shed light on relative job-skill mismatch patterns of migrants, by country of origin. In particular, the analysis will differentiate between migrants from (i) other European non-EU economies and from (ii) developing economies.

The analysis focuses on the period between 2000 and 2011 and differentiates between the pre-crisis period (2000-2008) and the post-crisis period (2009-2011) to account for the effects of the global financial crisis on job-skill mismatch patterns in the EU.

Figure 12 / The share of skill-type by job-type, separately for migrants and native workers: Manufacturing
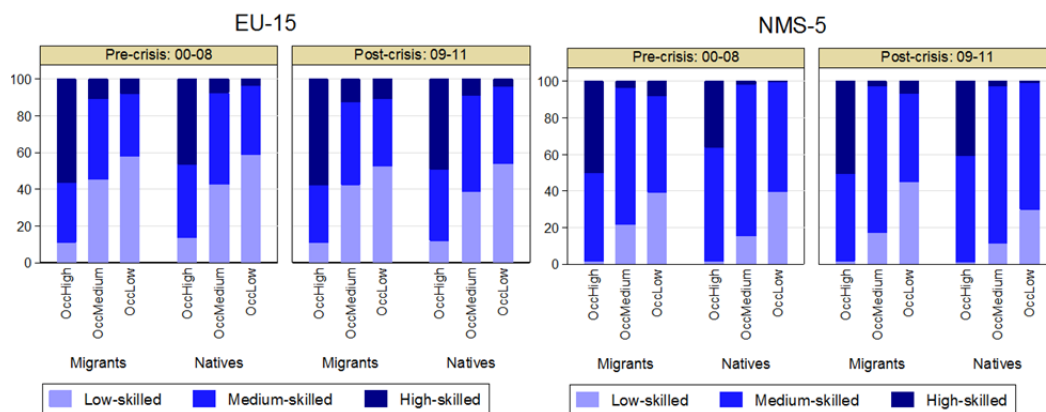
Source: LFS, own calculations.

Figure 13 / The share of skill-type by job-type, separately for migrants and native workers: Tradable Services
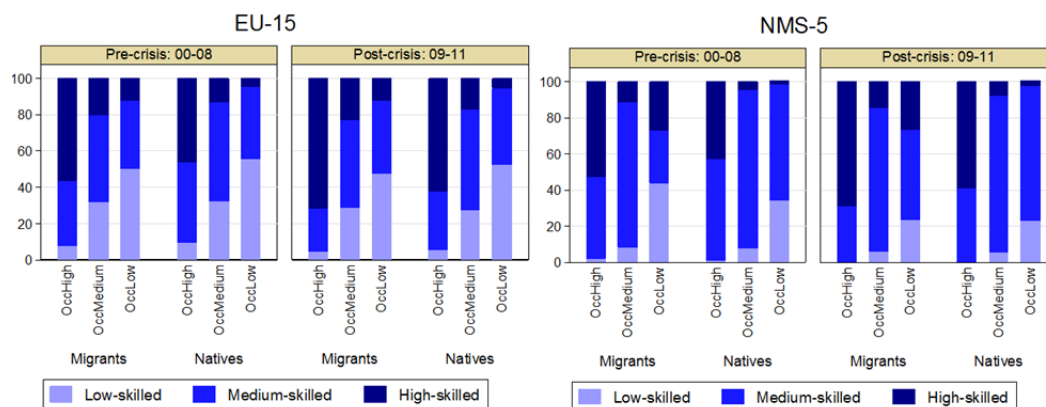
Source: LFS, own calculations.

Generally, migrants are identified in terms of their reported country of origin. However, for Germany, due to insufficient information on country of origin, nationality had to be used instead. Figures 12 and 13 give an overview of the shares of migrants and natives for the EU-15 and the NMS with high-, medium- and

low-educational attainment levels in high, medium and low occupations in two broad sectors of the economy, manufacturing and tradable services (comprising transport, communications and business services; see Annex Table 2 for a detailed sector classification). The figures show the educational and occupational compositions for the pre-crisis and post-crisis periods.

4.3   FINDINGS

4.4   JOB-SKILL MISMATCH OF MIGRANT AND NATIVE WORKERS

Let us now discuss the details: countries are clustered into two groups, namely EU-15 and NMS-5 countries. From the EU-15 country group, Luxembourg (LU) is excluded as an outlier, due to its special migration and commuting situation which led to a particularly high presence of migrants, particularly of high-skilled migrants from Europe and other developed countries. The country group NMS-5 comprises the Czech Republic (CZ), Hungary (HU), Poland (PL), Slovenia (SI) and Slovakia (SK) which all joined the EU in 2004. Moreover, since differences may also exist across individual countries, patterns are also analysed in more detail across a number of selected countries separately: i.e. Austria (AT), Germany (DE), Denmark (DK), Sweden (SE), Italy (IT) and the UK (UK). These countries can be seen as representing specific features which might affect the position of migrants in the labour market, such as particular wage-bargaining and welfare systems (see e.g. Hall and Soskice, 2001; Iversen, 2005): Central Europe (comprising AT and DE), Scandinavian countries (comprising DK and SE), the South European country IT and the Anglo-Saxon country UK.

In what follows, a set of graphs is shown which for three different types of job-skill matches (i.e. over-educated, correctly matched, under-educated) depict whether relative to native workers, migrant workers are over- or under-represented or equally represented in these various job-skill (mis)matches (using formula 4.3 above).

EU-15 AND NMS-5 - MANUFACTURING

Figure 14 shows the relative over- and under-representation of migrant vs native workers in EU-15 and NMS-5 countries in the manufacturing sector. Generally, the overall patterns (migrants vs. natives) in the 'over-educated' and 'under-educated' groups are relatively similar across the two country groups. Among the 'over-educated' group, highly-educated migrants show a higher over-representation (OccLskH and OccMskH). This over-representation of highly-educated migrants in job-types that require lower qualifications will be interpreted as a 'brain waste' (see, however, our *caveat* above that we cannot adjust for differences in the quality of the same formal levels of education). Remarkably, the over-representation (compared to natives) of highly educated migrants in job types with low qualification requirements (OccLskH) increased from nearly 220 percent in the pre-crisis period to over 300 percent in the post-crisis period. This may indicate that due to economic distress, the willingness of highly-educated migrants to accept job-types that require lower qualifications increased, resulting in an under-utilisation of their skills. Furthermore, with respect to highly-educated migrants in job-types with medium qualification requirements (OccMskH), a decrease in the over-representation of migrants can be observed in both the EU-15 and the NMS-5 countries, with, however, a pronounced decline in the NMS-5 (from 250 to 100 percent). The observable decline may be the result of an increase in unemployment of highly-educated migrants due to the economic crisis.

Figure 14 / Over-/under-representation of migrant relative to native workers: Manufacturing[9]
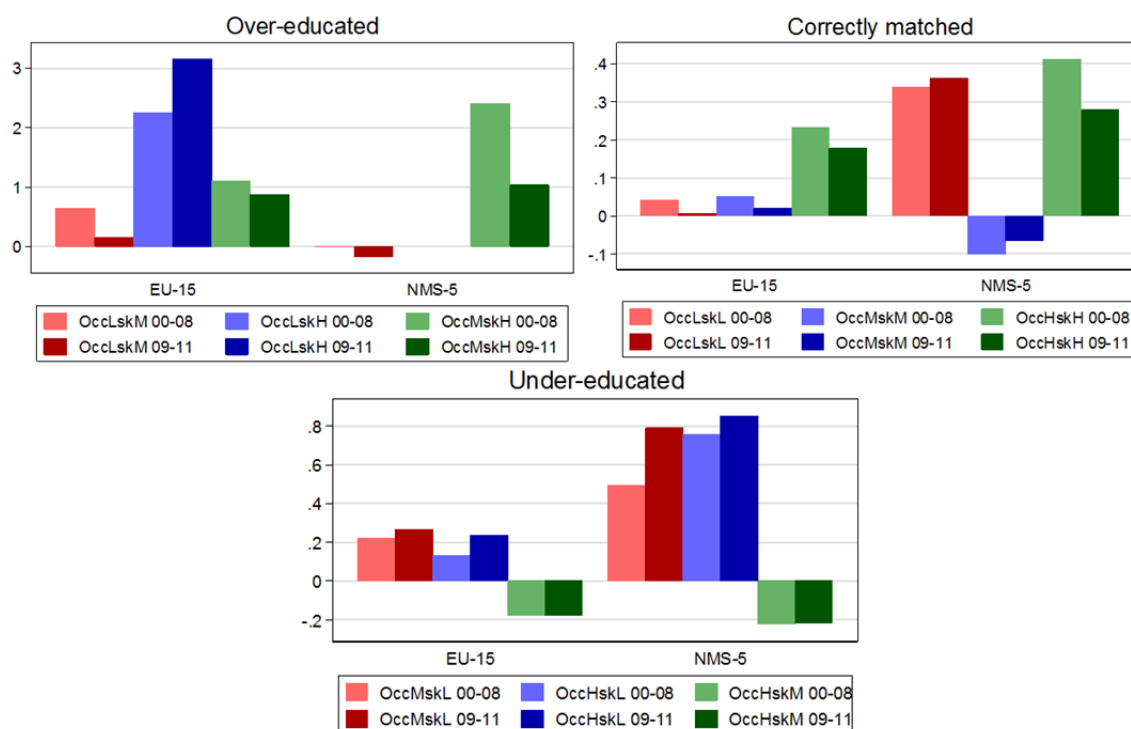
Source: LFS, own calculations.
Note: Luxembourg (LU) is excluded from the group of EU-15 countries.

Concerning the 'under-educated' group, low-educated migrants in job-types that require higher qualification levels (i.e. OccMskL and OccHskL) show a striking over-representation in the EU-15 and the NMS-5 (notice, however the different scales on the axes in the figures; i.e. the degree of over-education is much greater than that of under-education). In the case of the EU-15, this may be the result of an increase in the creation of small (or single-person) companies by migrants in which they occupied managerial or other 'higher level' jobs. Similarly, it may also be the result of more informal education that was obtained by migrants and enabled them to work in job-types that would otherwise require higher formal qualifications. In NMS-5 countries, the over-representation of low-educated migrants in job-types that require higher qualifications may be the result of a generally higher level of formal education in NMS-5 countries. This might have allowed access to higher qualification jobs for migrants from other European countries with lower levels of formal education – but high levels of informal training (e.g. experience of working in a market economy).

EU-15 AND NMS-5 - TRADABLE SERVICES

Figure 15 illustrates the over- and under-representation of migrant workers relatively to native workers in terms of educational attainment levels to job requirements in the tradable services sector (see Annex Table 2 for a definition of that sector). Generally, overall patterns are similar to the ones observable in the Manufacturing sector. With respect to the 'over-educated' group, highly-educated migrants (i.e.

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9   We adopted an outlier correction procedure which removed observations when the ratios calculated exceeded plus/minus two times the standard deviation from the mean.

OccLskH and OccMskH) are also relatively over-represented. In particular, in the NMS-5, the over-representation of highly-educated migrants in job-types that require medium qualifications stands out. Furthermore, the observable decline in OccMskH reflects the impact of the economic crisis. In particular, in times of economic distress, migrants are more likely to become unemployed than natives. And since in such hard times it is more difficult to find a new job, they show a higher willingness to take up a job that might require the lowest qualification only, leading to an observable rise in highly-educated migrants in job-types with lowest qualification requirements. Concerning the 'under-educated' group, the relatively high over-representation of low-educated migrants (i.e. OccMskL and OccHskL) in NMS-5 is noticeable. As discussed above, a higher number of well experienced and highly trained migrants from other European countries could be a potential reason.

Figure 15 / Over-/under-representation of migrant relative to native workers: Tradable services
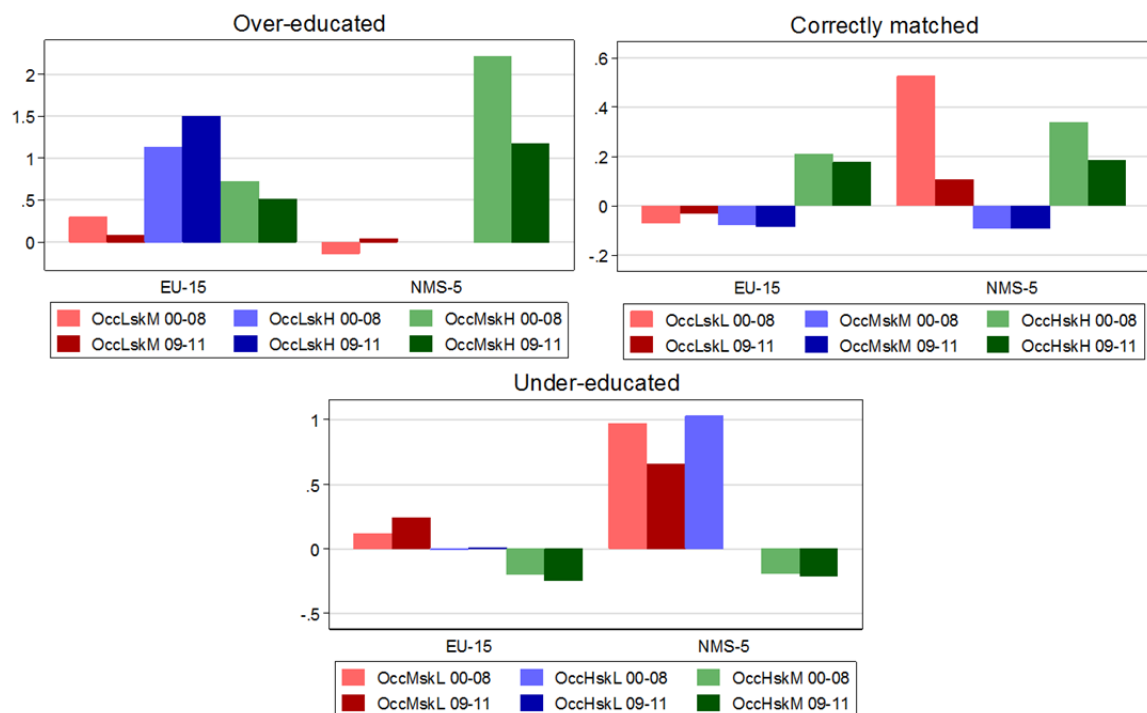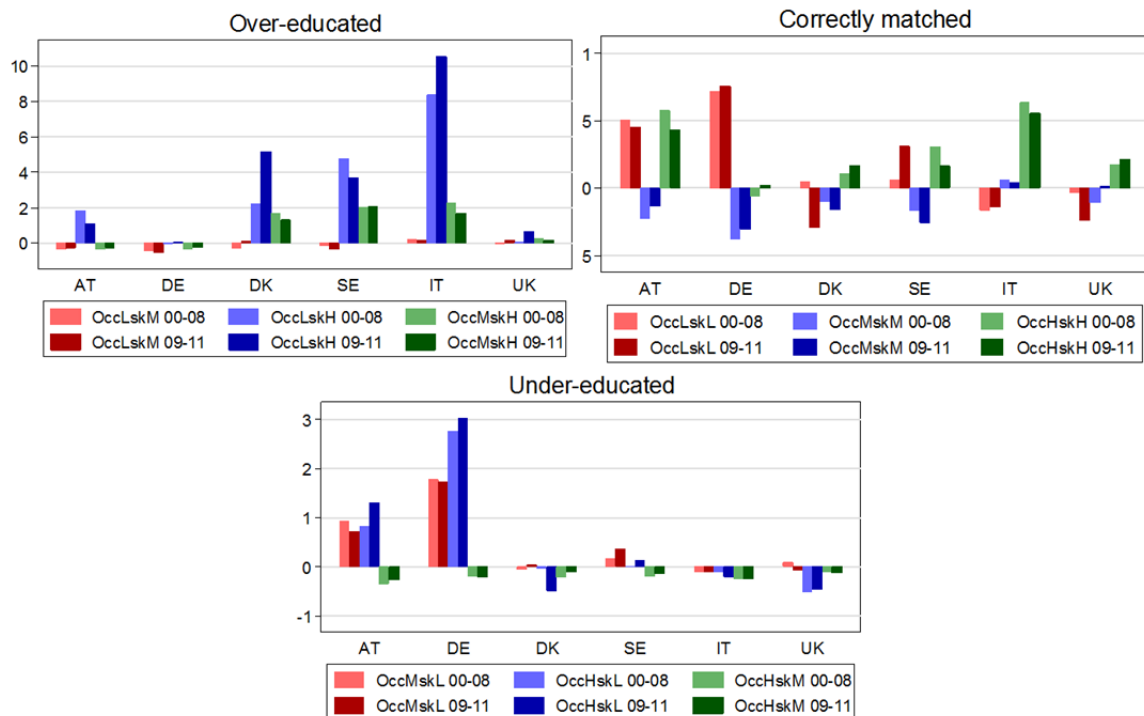

Source: LFS, own calculations.
Note: Luxembourg (LU) is excluded from the group of EU-15 countries.

BY COUNTRIES – MANUFACTURING (AT, DE, DK, IT, SE, UK)

Furthermore, to identify differences across countries, Figure 16 provides an overview of the relative over- and under-representation of migrant workers for some selected countries including Austria, Germany, Denmark, Sweden, Italy, and the UK. It points to a rather heterogeneous picture across the six countries considered. In particular, with regard to the 'over-educated' group, the relatively high mismatch of highly-educated migrants in job-types that require lower qualification is noticeable. Across the six countries considered, Denmark, Italy and Sweden show higher relative shares than Austria, Germany and the UK. Moreover, Germany and the UK show more or less equal shares of highly-educated migrants and native workers. In Germany one potential reason is the large manufacturing

sector which requires lower/medium qualifications and, due to different reasons (particularly the wage gap) also attracts highly-educated native workers to work there. In Italy, the relatively high over-representation of migrants in OccLskH, points to a high mismatch of highly-educated migrants in job-types that require lower qualification. This may be reflective of stronger cultural and language barriers in Italy which render access to high qualification jobs more difficult. In Denmark and Sweden, the higher over-representation of highly-educated migrants in low qualification job-types may be the result of higher educational standards compared to other countries. Hence, differences in the quality of schooling appear to be important. Furthermore, a comparison of Austria, Germany and the UK with Denmark, Italy and Sweden points to differences in labour market regulations. Specifically, the relatively balanced shares of migrants and native workers in the UK may be the result of more liberalised labour markets. With respect to the 'under-educated' group, the lowest-educated migrants are over-represented in Austria and Germany, whereas nearly equal shares of migrants and native workers are observable in Denmark, Italy and Sweden. As highlighted above, this may be the result of a higher incidence of migrants with low formal education levels, who are self-employed and run one-person or small enterprises. These enterprises include small carpentries or small telecommunications equipment shops with minor repair works or food producers/vendors. Moreover, differences in business laws and supporting governmental policies could also have an impact on differences in the setting-up of small self-employment businesses.

**Figure 16 / Over-/under-representation of migrant relative to native workers for selected countries: Manufacturing**

Source: LFS, own calculations.

BY COUNTRIES – TRADABLE SERVICES (AT, DE, DK, IT, SE, UK)

The relative 'over-', 'under-education' ratios between migrants and native workers for Austria, Germany, Denmark, Italy, Sweden and the UK in the tradable services sector are depicted in Figure 17. In the 'over-educated' group, the relatively high mismatch of highly-educated migrants is apparent particularly in Austria, Denmark, Italy and Sweden. On the contrary, Germany and the UK show low relative mismatches, pointing to pretty equal shares of low and medium-skilled migrant and native workers in medium and high-qualification jobs.

Figure 17 / Over-/under-representation of migrant relative to native workers for selected countries: Tradable services
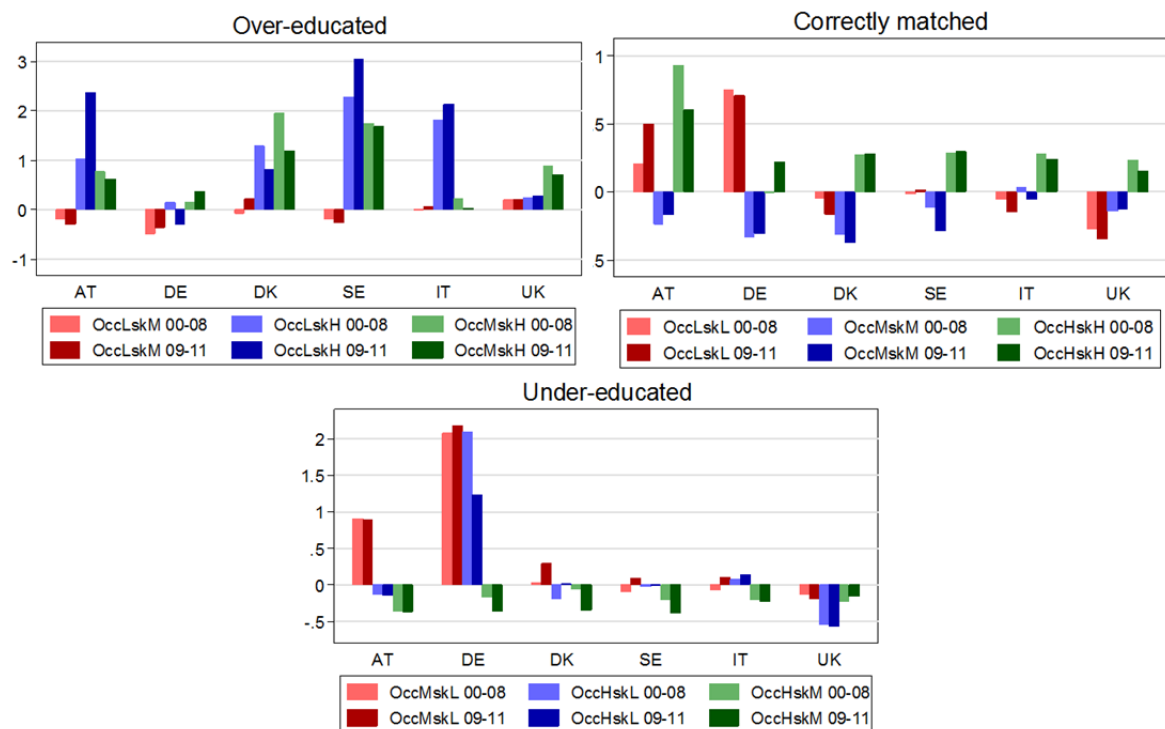
Source: LFS, own calculations.

## 4.5   JOB-SKILL MISMATCH OF MIGRANTS, BY COUNTRY OF ORIGIN

Next, we want to examine the role of a migrant worker's country of origin for the incidence of under- or over-education. For this purpose, the ensuing analysis differentiates between migrants from (i) other European non-EU economies and from (ii) developing economies[10]. However, due to limited data availability, the time horizon ranges from 2004-2008 in the pre-crisis period and from 2009-2011 in the post-crisis period. Furthermore, due to the low number of observations, results for NMS-5 countries will not displayed in what follows.

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[10]   The group of developing countries comprise all countries in Africa, Near and Middle East, Central America (and the Caribbean), South America as well as South and South East Asia. See also Annex Table 1.

EU-15 – MANUFACTURING, BY COUNTRY OF ORIGIN

Figure 18 depicts the extent of over- and under-representation of migrants in the EU-15 countries for the manufacturing sector, by country of origin. Generally, patterns looks pretty similar across country of origin groups. In the 'under-educated' group, there are no remarkable differences between migrant and native workers in both country of origin groups. However, the mismatch of highly-educated migrants in the 'over-educated' group is striking, particularly among migrants from developing countries, in both pre- and post-crisis periods. This may be the result of the relatively lower quality of schooling/training in developing countries or the more limited transferability of skills or the relatively restricted access of migrants from developing countries to host country labour markets.

Figure 18 / Over-/under-representation of migrant relative to native workers by country of origin: Manufacturing
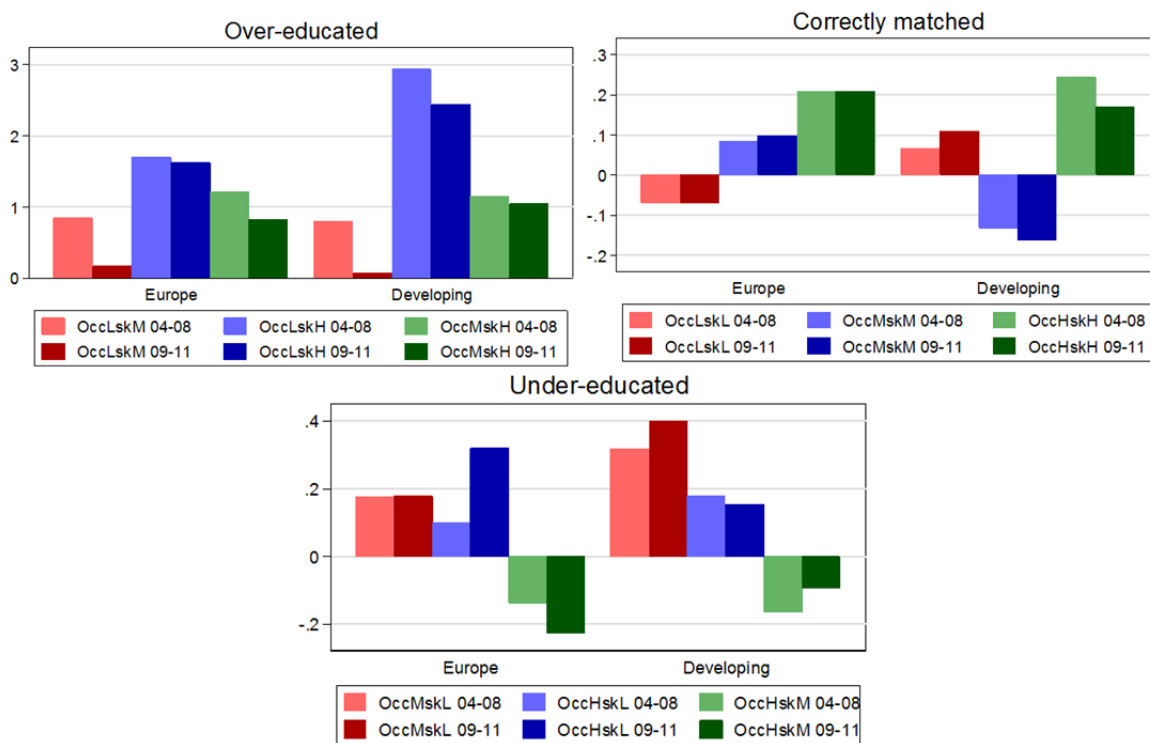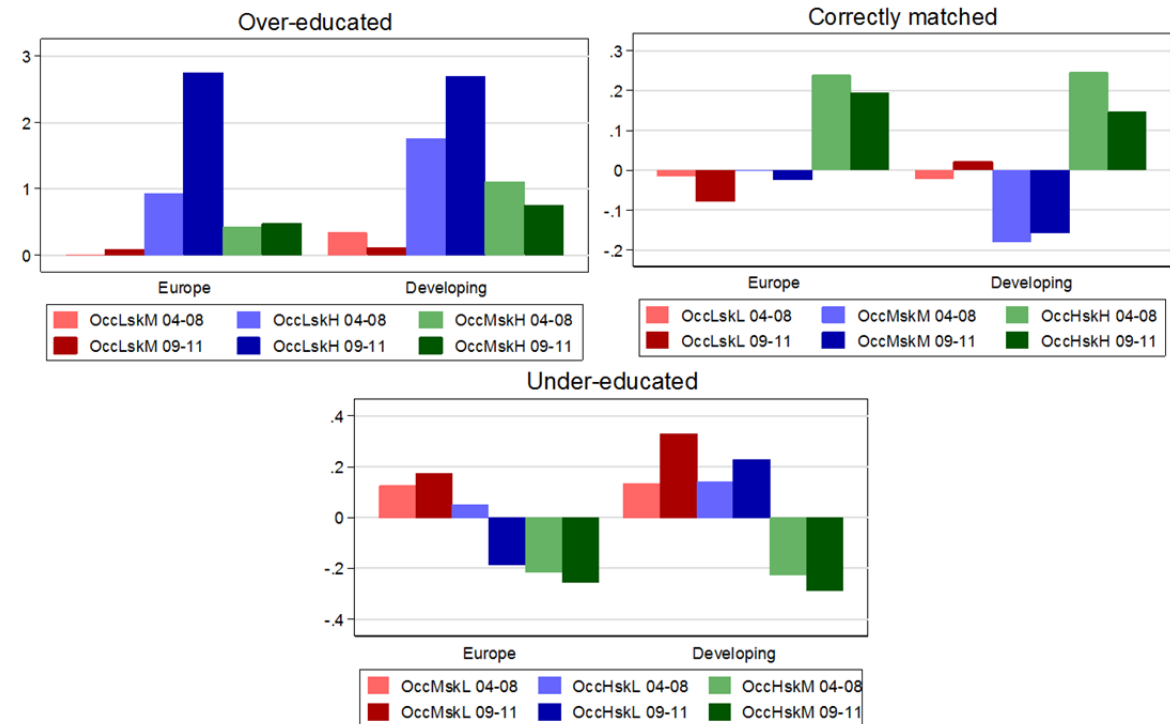

Source: LFS, own calculations.
Note: Luxembourg (LU) is excluded from the group of EU-15 countries.

EU-15 – TRADABLE SERVICES, BY COUNTRY OF ORIGIN

Results for the tradable services sector are shown in Figure 19. It highlights that the highest discrepancy between migrant and native workers is again observable in the 'over-educated' group. More specifically, the mismatch of highly-educated migrants is highest in job-types that require low qualifications (i.e. OccLskH). Furthermore, this mismatch is most pronounced among migrants from developing countries. However, in the course of the crisis, this mismatch reached almost equal levels of around 250 percent, irrespective of a migrant's country of origin. This may suggest that highly-educated migrants were forced to work in job types that require the lowest qualifications, regardless of the country of origin and

indicates that irrespective of the country of origin, migrants in the tradable services sector were more strongly affected by the economic crisis than migrants in the manufacturing sector.

Figure 19 / Over-/under-representation of migrant relative to native workers by country of origin: Tradable services

Source: LFS, own calculations.
Note: Luxembourg (LU) is excluded from the group of EU-15 countries.

INDIVIDUAL COUNTRIES – MANUFACTURING AND TRADABLE SERVICES (AT, DE, DK, IT, SE, UK)

Finally, Annex Figure 10 to Annex Figure 15 show the relative over- and under-representation of migrants workers by country of origin for some selected countries, namely Austria, Germany, Denmark, Sweden, Italy, and the UK.

In the 'over-educated' groups, similarities and differences across countries are observable. Generally, in the 'over-educated' groups, the stronger over-representation of highly-educated migrants (i.e. OccLskH and OccMskH) is again striking, although differences across individual countries, migrants' country of origin and sectors are apparent. For instance, Austria and Germany show very similar patterns among the 'over-educated' group. What is striking is the high incidence of highly-educated migrants (especially in low qualification job-types) from developing countries in both sectors. However, in Austria, in the course of the crisis, this discrepancy for migrants from developing countries shrank dramatically in the manufacturing sector, from approximately 600 percent prior to the crisis to 100 percent after the crisis. Furthermore, observable patterns are remarkably similar in Denmark and Sweden, irrespective of sector or country of origin considered, which may be related to the generally higher educational levels in both

countries. In Italy, irrespective of country of origin, the 'over-educated' group is dominated by the high over-representation of highly-educated migrants. This is particularly pronounced in the manufacturing sector. In the UK, no common pattern emerges in the 'over-educated' group. In general, the extent of over- and under-education of migrants and native workers tends to be more equal in UK than in other countries. This could be linked to the high degree of liberalisation of the labour market in the UK.

With respect to the 'under-educated' group, obvious differences in levels and patterns can be observed. However, with the exception of Germany, levels tend to be higher in the 'over-educated' group. In Austria and Germany, while general patterns look similar, levels strongly differ and tend to be higher in Germany which may point to the ease with which small single-member companies can be founded in Germany relative to other countries. In all other countries under consideration, the relative shares are considerably smaller than in Austria and Germany. In Denmark, Sweden, Italy and the UK, relative to native workers, migrant workers of low and medium-skill types tend to be under-represented. This is particularly true for the UK, where irrespective of sector or country of origin, low and medium-skilled migrants are under-represented in jobs that require medium or high qualifications.

5   Summary and conclusion

This paper attempted to contribute to the important issue of mobility patterns on labour markets in the European Union. The relevance of this topic for the functioning of a Monetary Union but also beyond that – more generally – for matching processes on labour markets between patterns of demand and supply in all its dimensions - over the cycle, across skill groups and occupations, across sectors, across regions, adjusting to life cycles across age groups etc. - has been pointed out in an introductory section of this paper.

In this paper, the particular focus was the role of migrants contributing to mobility patterns across the EU economies. We used two main indicators of labour market mobility following Davis and Haltiwanger's analysis: the gross employment mobility rate (GERR) which looks at changes in labour market status in an additive manner (i.e. in and out of jobs) and the net employment rate (NECR) which counts net additions in employment.

Part One of this study gave a descriptive account of labour mobility patterns in older and new member states (the EU-Advanced, the EU-South, the NMS-5 and the Baltics) along the various dimensions: migrants vs. natives, by age groups, by skill groups, by gender, across sectors and across regions. In general we found that migrants show significantly higher gross and net mobility both at the aggregate economy level as well as cross-sectorally and cross-regionally.

Part Two of the study analysed the issue of 'job-skills (mis) matches' and again focused on the differences of incidences of 'over-education' (i.e. a person having higher educational attainment levels compared to the job requirement) and 'under-education' (the opposite) between migrants and natives. Again we distinguished patterns in OMS and NMS and in the pre-crisis and post-crisis periods. The general result is that migrants show a much higher degree of 'over-education' than natives particularly in 'low occupation' activities. During the crisis we see an even stronger incidence of migrants with high educational attainment levels taking jobs in 'low occupation' activities. There is also a distinct difference of 'skill-jobs mismatch' or 'brain waste' between migrants from Developing Countries as against migrants from other European countries.

From a policy angle we come to the following conclusion:

Our study (together with the companion study; see Landesmann and Leitner, 2015b) came out with substantive evidence for the 'greasing of the wheels' effect of migrants in relation to labour market mobility: migrants have a higher elasticity of mobility across the cycle, and they contribute to inter-sectoral and inter-regional mobility. On the other hand, we also found substantive evidence of 'job-skill mismatch', particularly with respect to migrants from developing countries. As this amounts to 'brain waste', policies focussing on this issue should be welcomed to increase both the welfare of the migrants as well as enhance the productivity- and growth-contributing effects of migrants on the host economies.

6   References

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7   Annex

Annex Table 1 / Classification of nationality/country of birth

EUROPE	DEVELOPING
EU-27	Africa
EFTA	Near and Middle East
Other Europe (Albania, Andorra, Belarus, Bosnia	Central America (and Caribbean)
Herzegovina, Croatia, Faroe Islands, FYR Macedonia,	South America
Kosovo, Monaco, Montenegro, Republic of Moldova,	South and South East Asia
Russian Federation, San Marino, Serbia, Turkey, Ukraine,	
Vatican City)	

Annex Table 2 / Classification of industries

| NACE rev.1		NACE rev.2	
A Agriculture, hunting and forestry		A Agriculture, forestry and fishing	
B Fishing		B Mining and quarrying	
C Mining and quarrying		C Manufacturing	
D Manufacturing		D Electricity, gas, steam and air cond. supply	
E Electricity, gas and water supply		E Water supply, sewerage, waste manag., etc.	
F Construction		F Construction	
G Wholesale, retail trade, repair motor veh.	NT	G Wholesale, retail trade, repair of motor veh.	NT
H Hotels and restaurants	NT	H Transportation and storage	T
I Transport, storage and communications	T	I Accommodation and food service activities	NT
J Financial intermediation	T	J Information and communication	T
K Real estate, renting & business activities	NT	K Financial and insurance activities	T
L Public admin., defence, compuls. soc. sec.	NMS	L Real estate activities	NT
M Education	NMS	M Professional, scientific and techn. activities	T
N Health and social work	NMS	N Administrative and support service active.	NT
O Oth. Community, social & personal serv.	NT	O Public admin., defence, compuls.soc.sec.	NMS
P Private households with employed pers.	NT	P Education	NMS
Q Extra-territorial organisations and bodies	excluded	Q Human health and social work activities	NMS
		R Arts, entertainment and recreation	NT
		S Other service activities	NT
		T Activ. of househ.as employers & for own use	NT
		U Activ. of extraterritorial organisat. & bodies	excluded

Note:

TS – Tradable Services	I+J	TS – Tradable Services	H+J+K+M
NTS – Non-tradable Services	G+H+K+O+P	NTS – Non-tradable Services	G+I+L+N+R+S+T
NMS – Non-market Services	L+M+N	NMS – Non-market Services	O+P+Q

Annex Figure 1 / Status change: gross employment reallocation rates (GERR), by countries
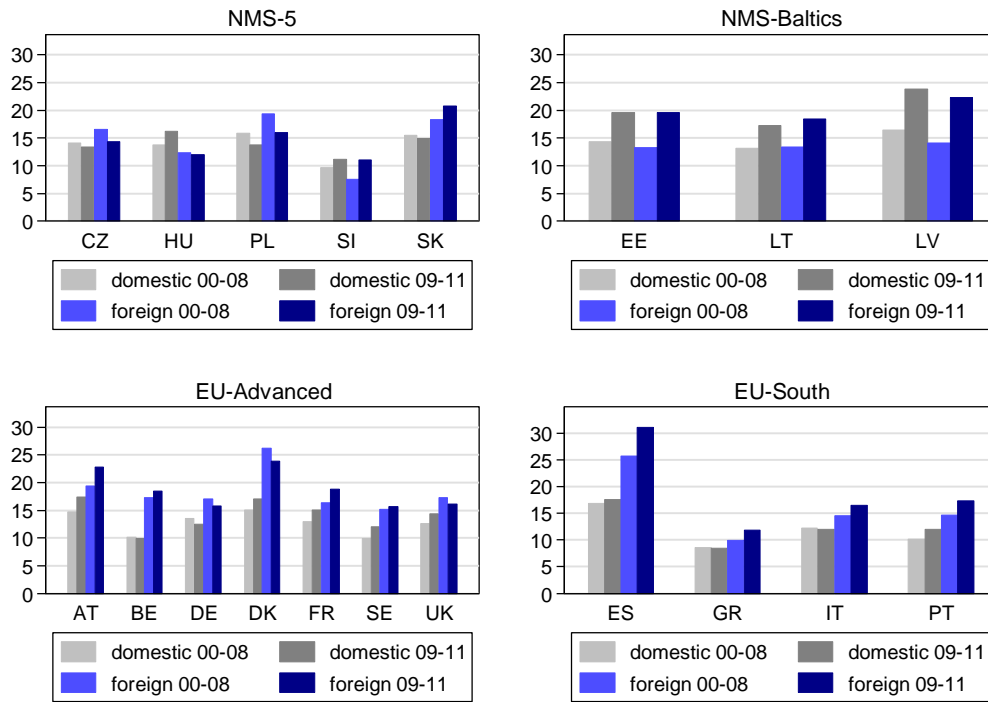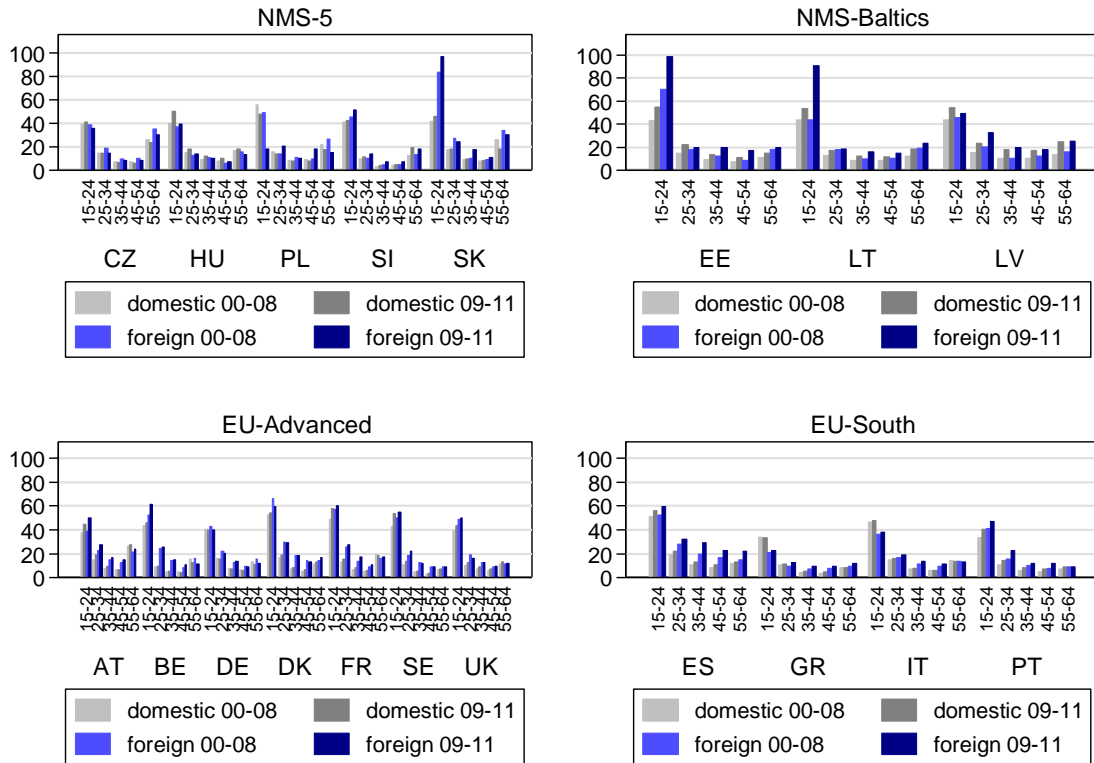

Source: LFS, own calculations

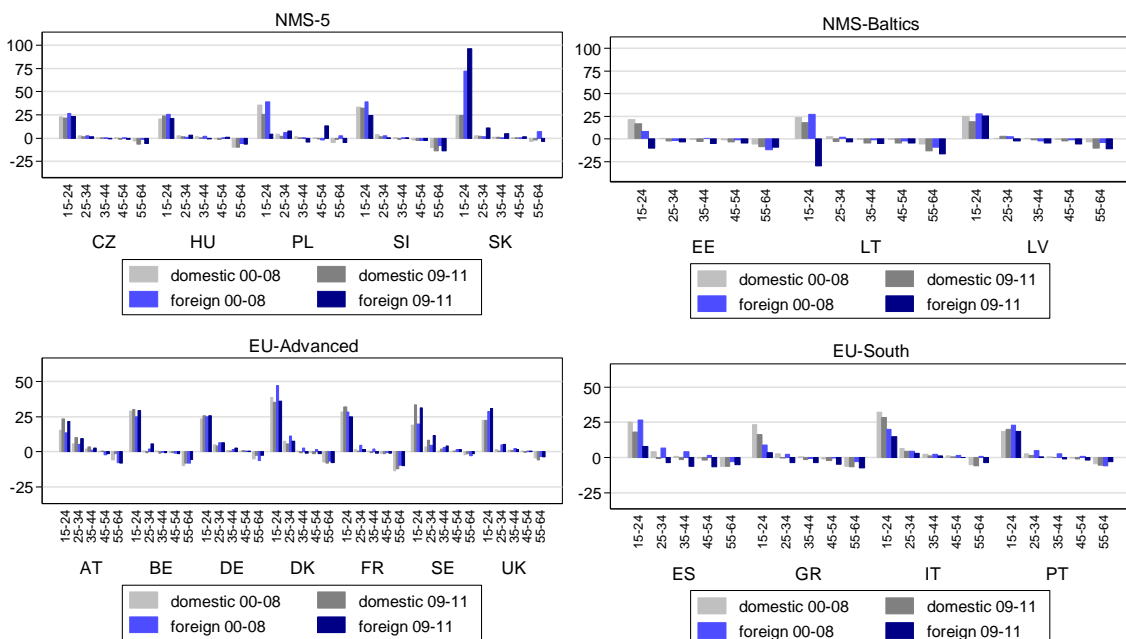**Annex Figure 2 / Status change: net employment creation rates (NECR), by countries**
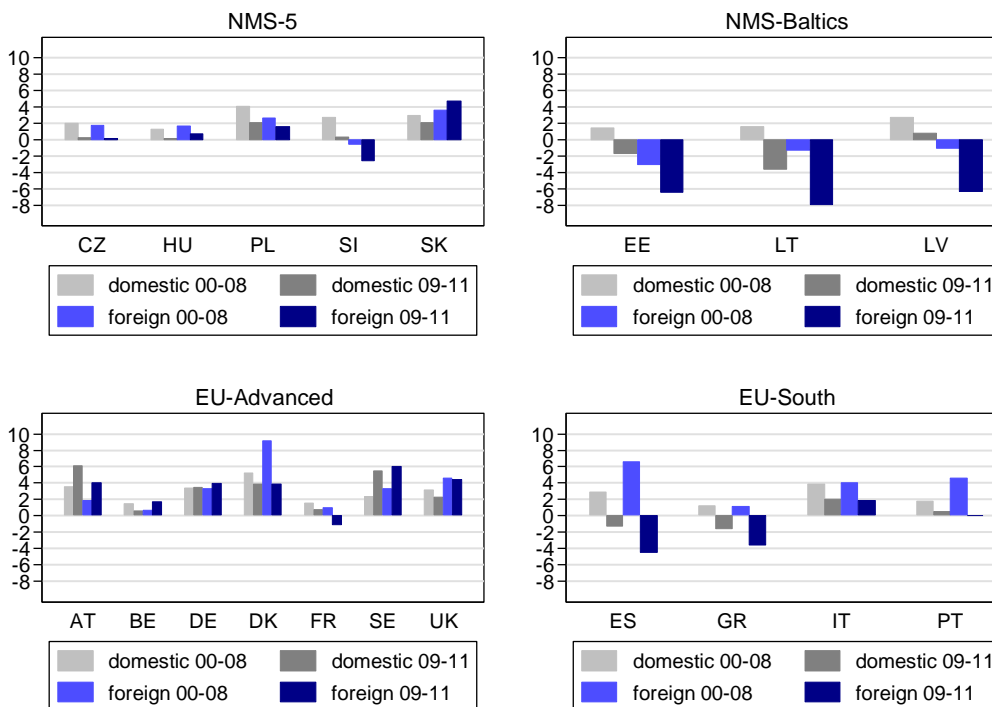
Source: LFS, own calculations

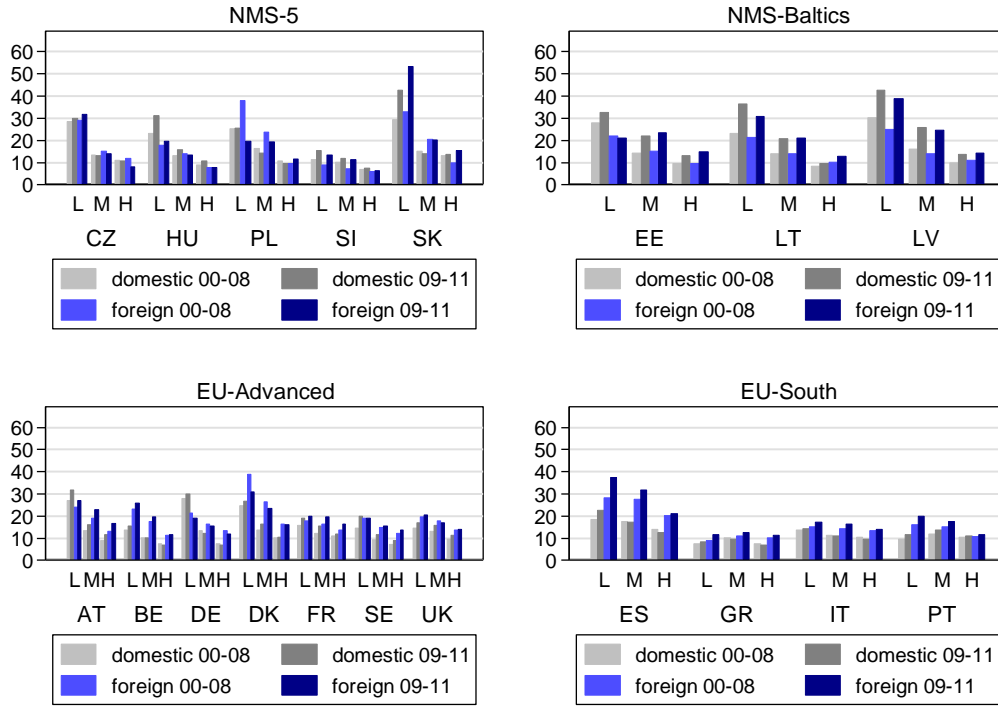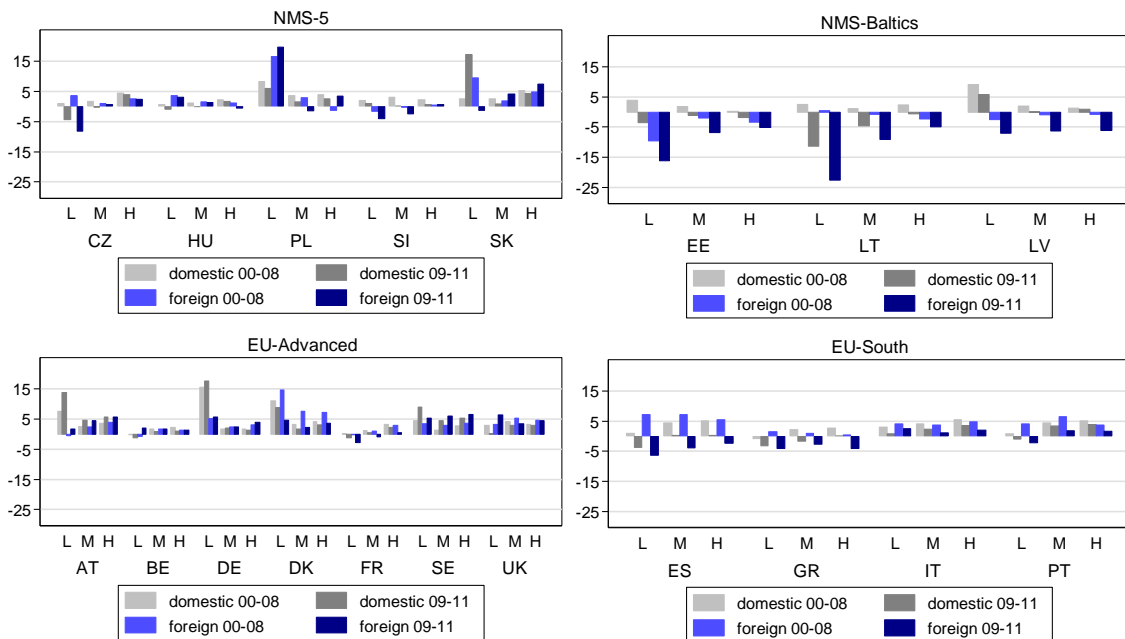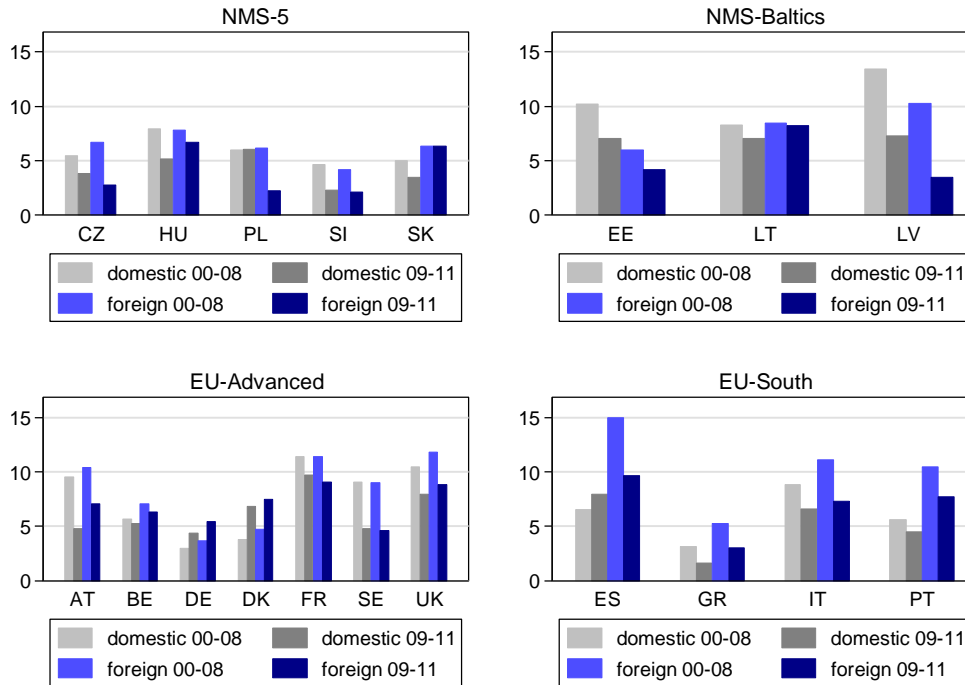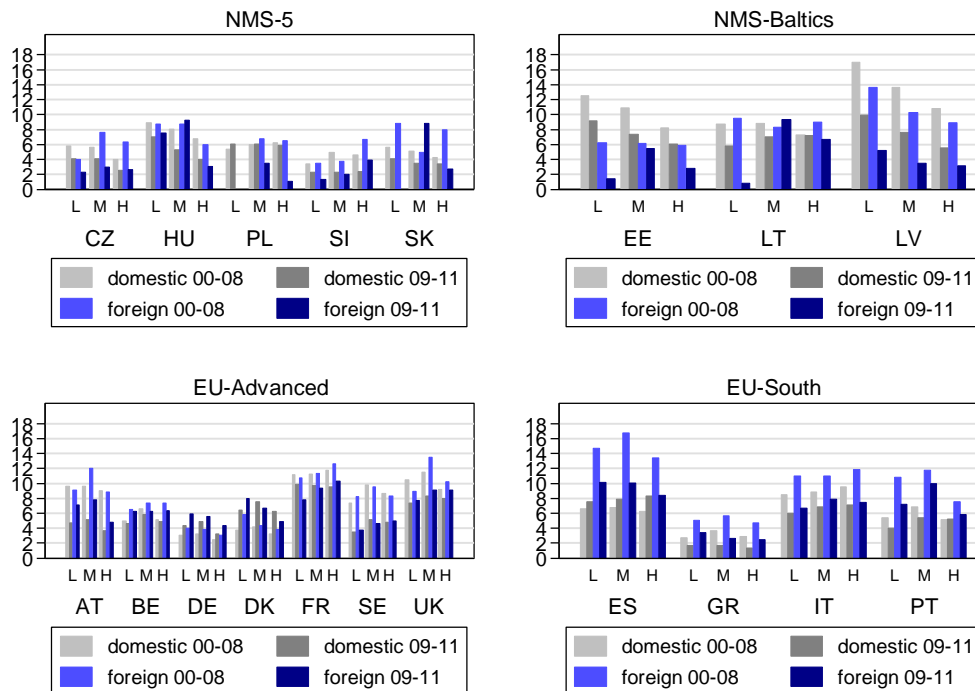**Annex Figure 3 / Status change: gross employment reallocation rates (GERR), by countries and age**

Source: LFS, own calculations

Annex Figure 4 / Status change: net employment creation rates (NECR), by countries and age

Source: LFS, own calculations

Annex Figure 5 / Status change: gross employment reallocation rates (GERR), by countries and skill-groups

NMS-5

NMS-Baltics

EU-Advanced

EU-South

Source: LFS, own calculations

Annex Figure 6 / Status change: net employment creation rates (NECR), by countries and skill-groups

NMS-5

NMS-Baltics

EU-Advanced

EU-South

Source: LFS, own calculations

Annex Figure 7 / Inter-sectoral mobility: gross employment reallocation rates (GERR), by countries

Source: LFS, own calculations

Annex Figure 8 / Inter-sectoral mobility: gross employment reallocation rates (GERR), by countries and skill groups

Source: LFS, own calculations

Annex Figure 9 / Regional mobility: gross employment reallocation rates (GERR), by countries
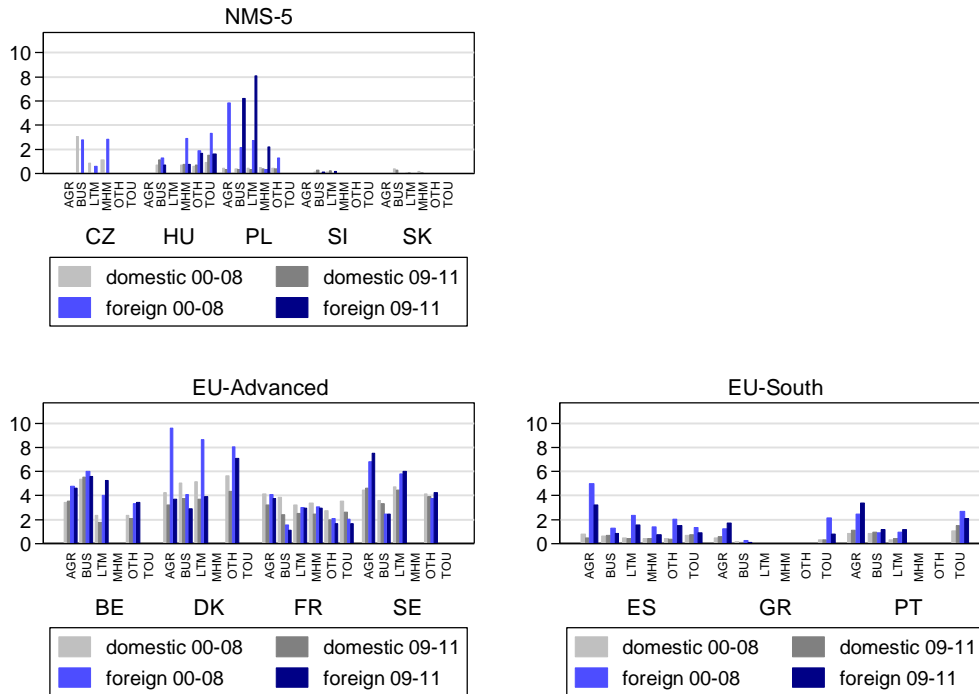
Source: LFS, own calculations

Annex Figure 10 / Over-/under-representation of migrant relative to native workers by country of origin: Austria
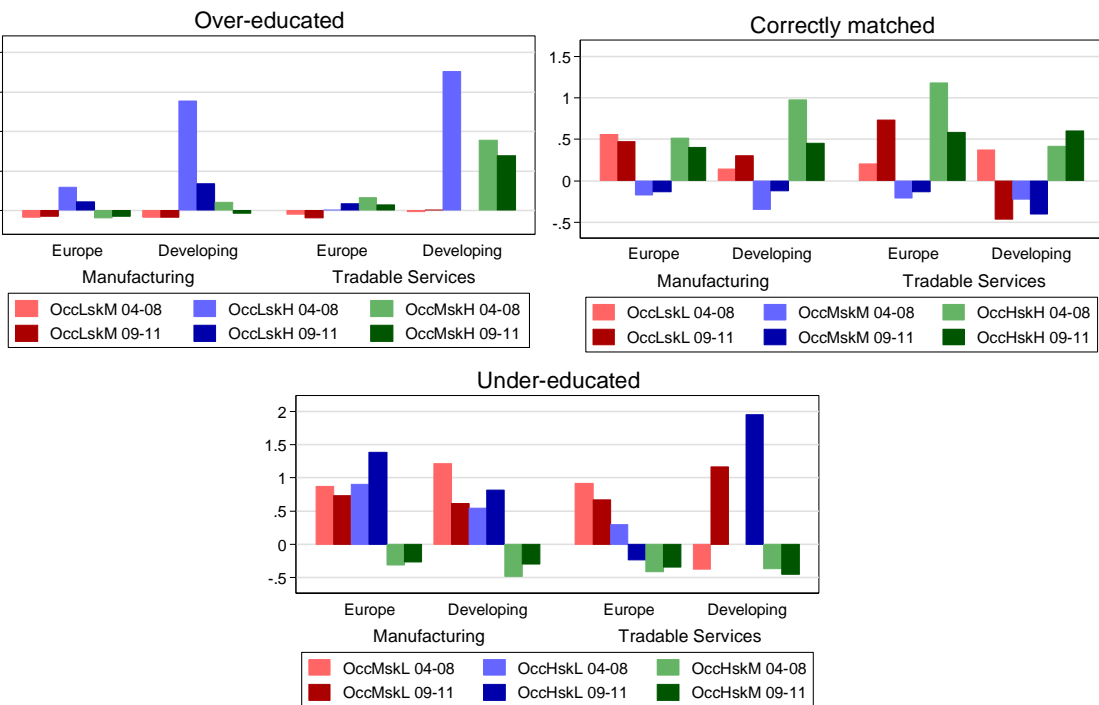
Source: LFS, own calculations

Annex Figure 11 / Over-/under-representation of migrant relative to native workers by country of origin: Germany
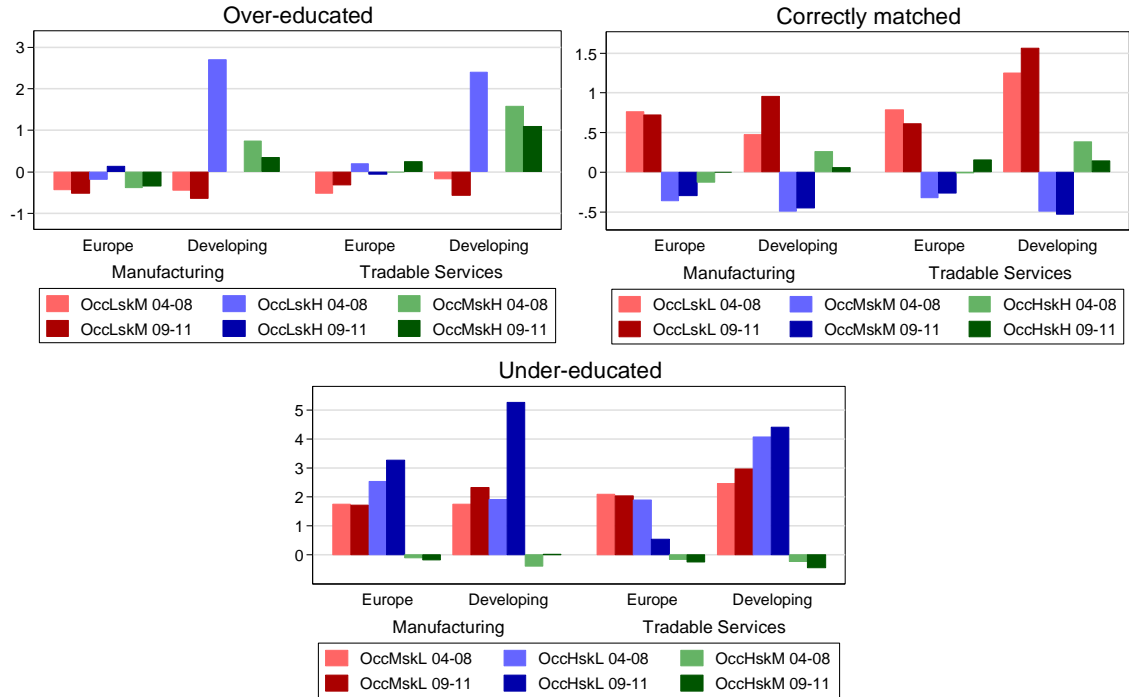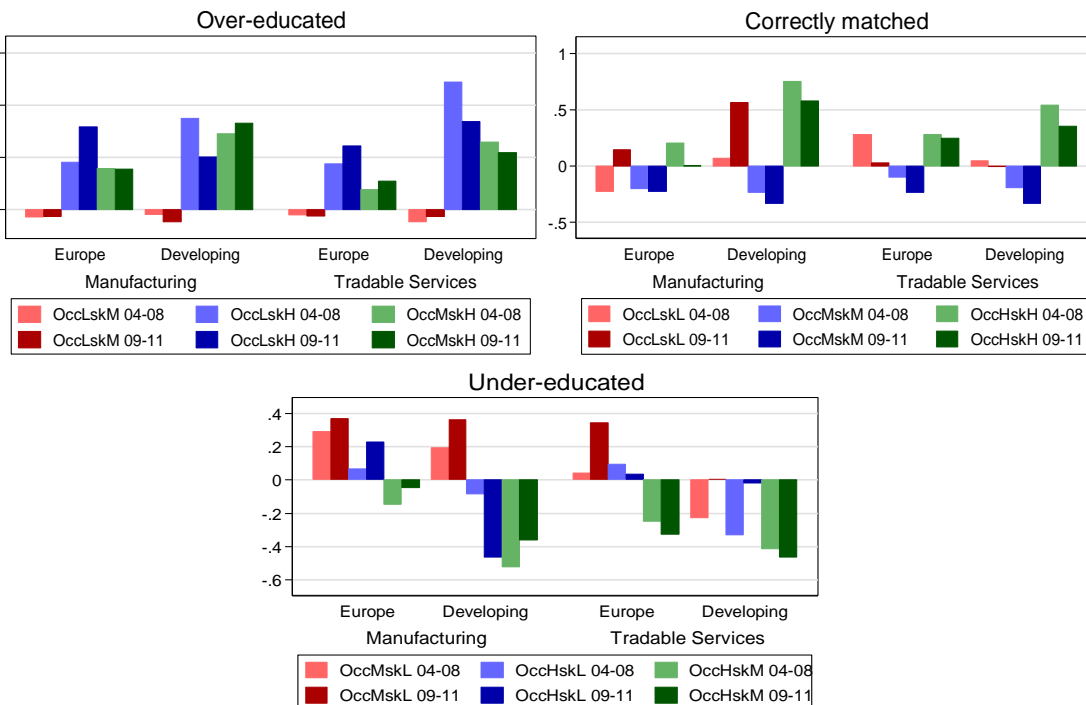

Source: LFS, own calculations

Annex Figure 12 / Over-/under-representation of migrant relative to native workers by country of origin: Denmark
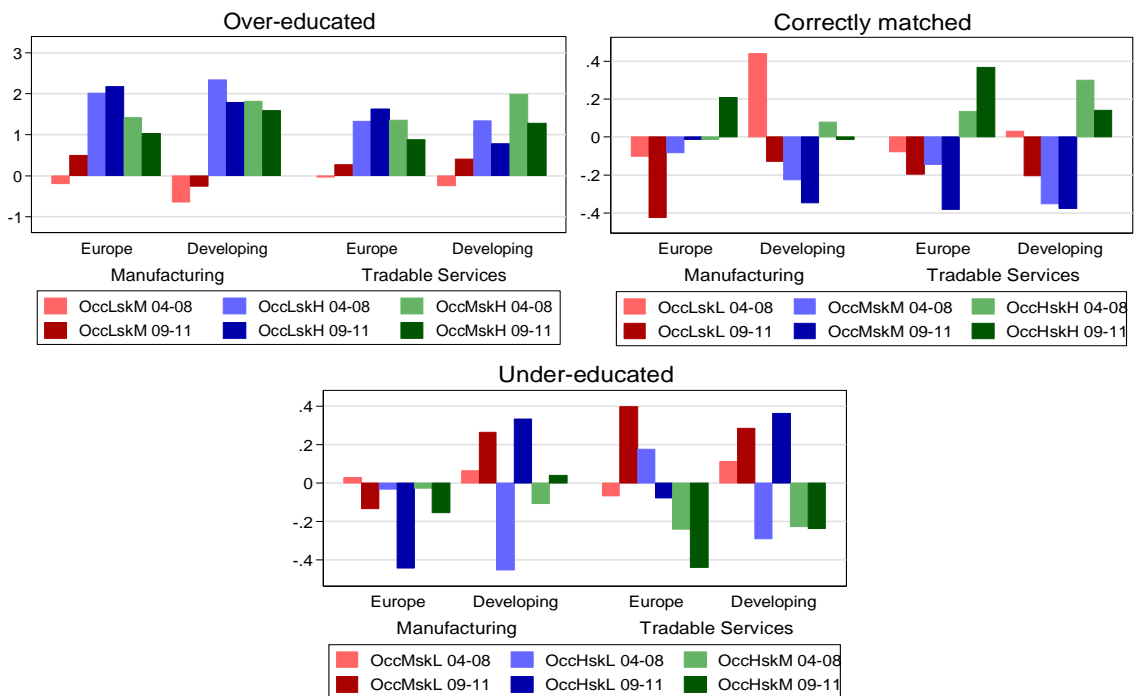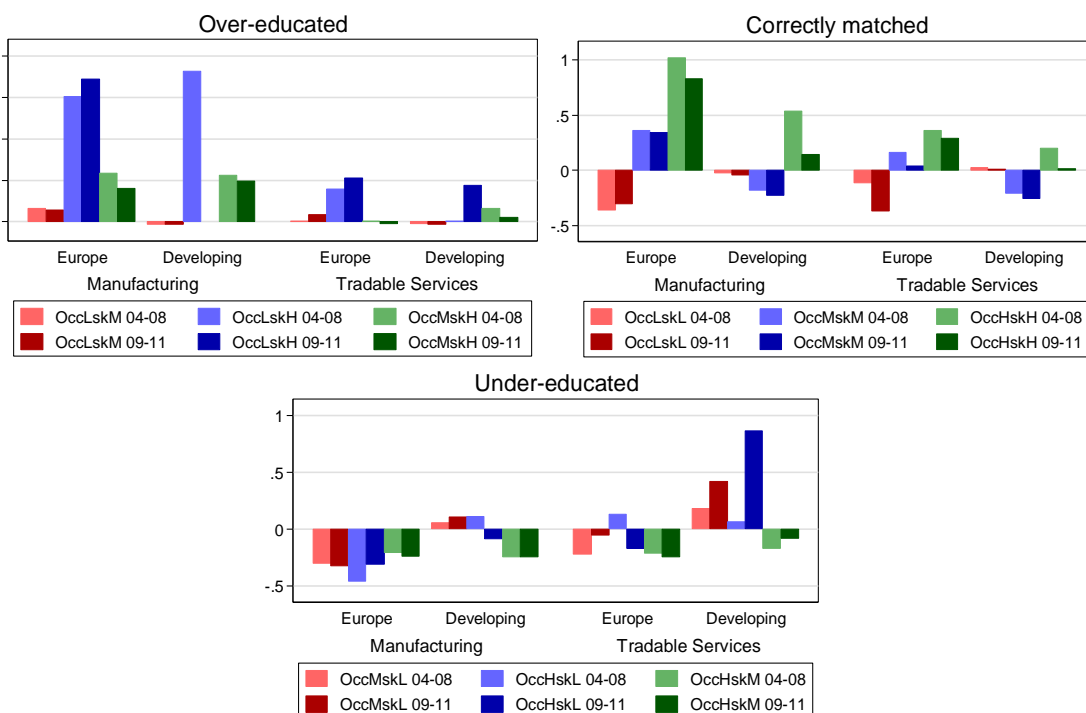

Source: LFS, own calculations

Annex Figure 13 / Over-/under-representation of migrant relative to native workers by country of origin: Sweden
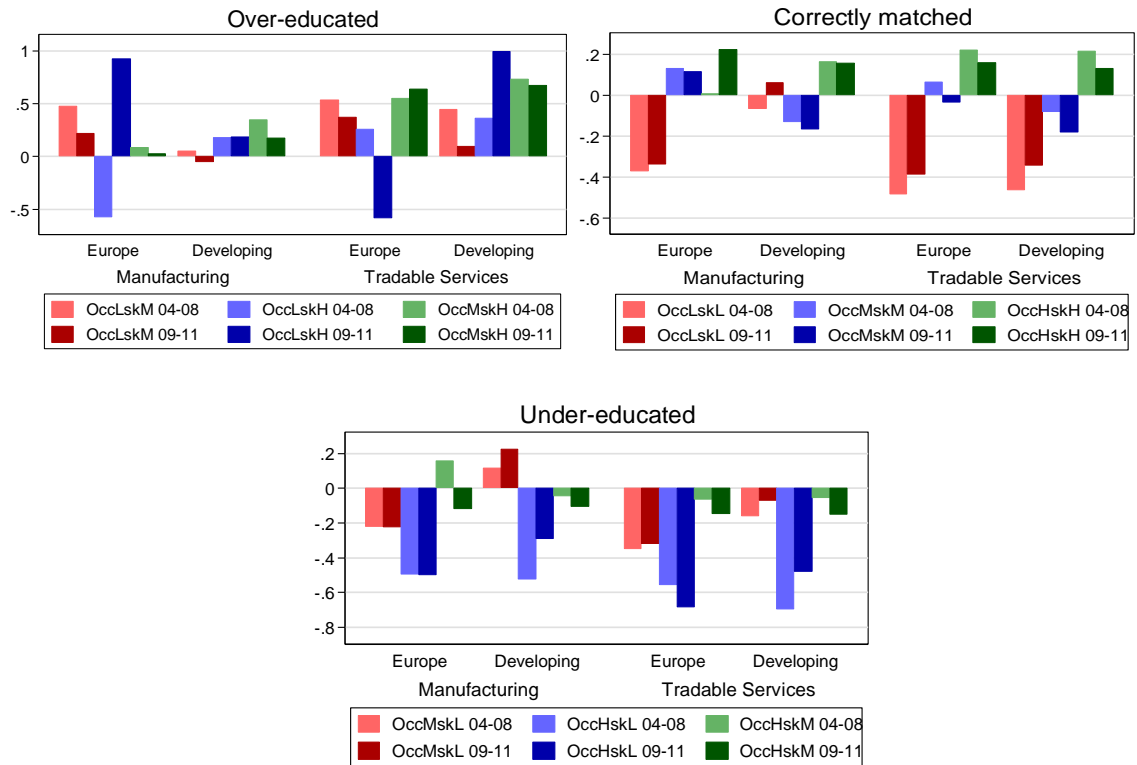

Source: LFS, own calculations

Annex Figure 14 / Over-/under-representation of migrant relative to native workers by country of origin: Italy

Source: LFS, own calculations

Annex Figure 15 / Over-/under-representation of migrant relative to native workers by country of origin: UK

Source: LFS, own calculations

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