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# **Migrants and Economic Performance in the EU15: their allocations across countries, industries and job types and their (productivity) growth impacts at the sectoral and regional levels**

Michael Landesmann, Robert Stehrer und Mario Liebensteiner

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## **Abstract**

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Studies regarding the migrants' impact upon performance variables and in particular upon productivity growth – which is the focus of this study - are few although there has been an increased interest in this area. This study addresses this issue in a cross-country and regional perspective with a focus on EU-27 countries at the industry level. In the first part of the study the focus is on employment patterns of migrants regarding their shares in employment, the composition in terms of places of origin, and an important aspect of the analysis is the study of their 'skills' (measured by educational attainment levels) and the utilisation of these skills relative to those of domestic workers. The second part of the study conducts a wide range of 'descriptive econometric' exercises analysing the relationship between migrants employment across industries and regions and output and productivity growth. We do obtain robust results with respect to the positive impact of the presence of high-skilled migrants especially in high-education-intensive industries and also more generally – but less robustly – on the relationship between productivity growth and the shares of migrants and of high-skilled migrants in overall employment. There is also an analysis of the impact of different policy settings with respect to labour market access of migrants and to anti-discrimination measures. The latter have a significant positive impact on migrants' contribution to productivity growth. In the analysis of impacts of migrants on value added and labour productivity growth at the regional level we add migration variables to robust determinants of growth and find positive and significant relationships between migrants' shares (and specifically of high-skilled migrants) and regional productivity growth. The limitations of the study with respect to data issues, causality and selection effects are discussed which give scope for further research.

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Michael Landesmann, Robert Stehrer und Mario Liebensteiner



FIW – Research Centre International Economics

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## 1. Introduction

This study follows up work originally started under a contract from the European Commission as a background study for the European Competitiveness Report under the title 'Migration, Skills, and Productivity' (for details see Huber et al., 2009).

However, the work contained in the present study is a new text based on completely new calculations and new econometric work regarding the relationship between migrants and economic performance.

Work in this (as in the previous) study is mostly based on exploiting the data contained in the European Labour Force Statistics (LFS) which allows an identification of labour force and employees by place of birth, age, gender, by educational attainment levels, industries and regions in which they work, types of occupations etc. The coverage of 'migrants', defined in this study as born outside the country of residence, might not be properly representative as the LFS has not been originally conceived as using appropriate sampling techniques along all the above dimensions. Also, the coverage of migrants in the LFS country samples might be sparse in absolute numbers. As a result one has to be rather careful which detail is being looked at (e.g. the breakdown of migrants by place of birth, or by industry or region they are employed in, or by age cohort, etc.) in different parts of the analysis. Over time and as awareness of the very important challenge which migration poses to the European policy agenda grows, we are convinced that LFS (and other) statistics will attempt to pay careful attention to representativeness of migrants in the respective samples. At the moment we shall have to use this data-set with an appropriate *caveat*.

The LFS data have in this report been supplemented with industrial statistics (specifically the EUKLEMS database see [www.euklems.net](http://www.euklems.net)) in order to capture industry performance variables and with EU regional statistics in order to conduct the econometric analysis at the NUTS 2-digit regional level.

Although the results in this study are still preliminary (e.g. issues of causality require much further work), we believe that this and the previous study (see Huber et al, 2009) is nonetheless a pioneering attempt to focus on an issue related to migrants' presence in European economies which has so far not received the due attention it deserves, at least at the cross-European level which we have aimed at. The reason for this is that most economic/econometric studies of migrants' impact has been aimed at labour market impacts, i.e. upon wage and employment impacts on domestic labour forces. The studies regarding the migrants' impact upon performance variables, in particular upon productivity growth, are few although there has been an increased interest in this area more recently (see e.g. Hunt and Gauthier-Loiselle, 2009; Peri, 2009; Paserman, 2008). What has been

done so far on this topic has been well reviewed in the Huber et al study (see the literature review in Ch.1 of that study) and therefore we shall not review the literature over here (see, however, our bibliography). Almost without exception the studies in the area 'migration and productivity' have so far been done using individual country data-sets and not in the cross-European setting we adopt in this study. In this sense we think that this study and its predecessor will pave the way towards much further work which will recognise the complex impact of migrants upon economic performance in a cross-European context. This is of importance as Europe develops further in the direction of an integrated labour market and migration research in Europe has nonetheless the benefit of the existence of a multitude of national and regional policy settings which affect the utilisation of migrants' potentials, their selection, their allocations across jobs, industries and regions and hence their impact upon economic performance. From this perspective, Europe offers currently, both statistically and methodologically, a unique opportunity to study the issue of migrants' roles in affecting economic performance and which policy-settings affect that impact. Hence, we are convinced that this study will soon be followed by others exploiting the increased availability of cross-country data-sets and the motivation to study migrants' impacts upon economic performance in heterogeneous social and policy-settings.

The study comprises the following:

Part I ('Migrants in the EU-15 - allocations by country, industries and job types - descriptive analysis') analyses the position of migrants in the EU15 economies. We look at details regarding their shares in employment, the composition in terms of places of origin, and an important aspect of the analysis is the study of their 'skills' (measured by educational attainment levels) and the utilisation of these skills relative to those of domestic workers. We see how the skill composition differs across economies and we analyse the allocation of migrants' skills in different sectors of the economy; here we distinguish between sectors which more generally require relatively more 'high', 'medium' and 'lower level skills'. In an analysis of skills-jobs matching we present indicators of 'mismatches' in the sense of differences between migrant and domestic workers in the utilisation of skills in different types of 'jobs'. Finally, in preparation of the econometric analysis undertaken in Part II, we analyse the allocation of migrants (again differentiated by skill groups) across fast, medium and slow output and productivity growth industries.

Part II ('Migrants and productivity growth – regional and sectoral impacts - econometric analysis') conducts a wide range of 'descriptive econometric' exercises to study the relationship between migrants employment across industries and regions and output and productivity growth. We call these exercises 'descriptive econometric' because the issues of causality and selectivity could not be properly addressed with the data-set we had at our disposal and hence further research will be called forth in this respect. We do find robust results with respect to the positive impact of the presence of high-skilled migrants especially in high-education-intensive industries and also more generally – but less

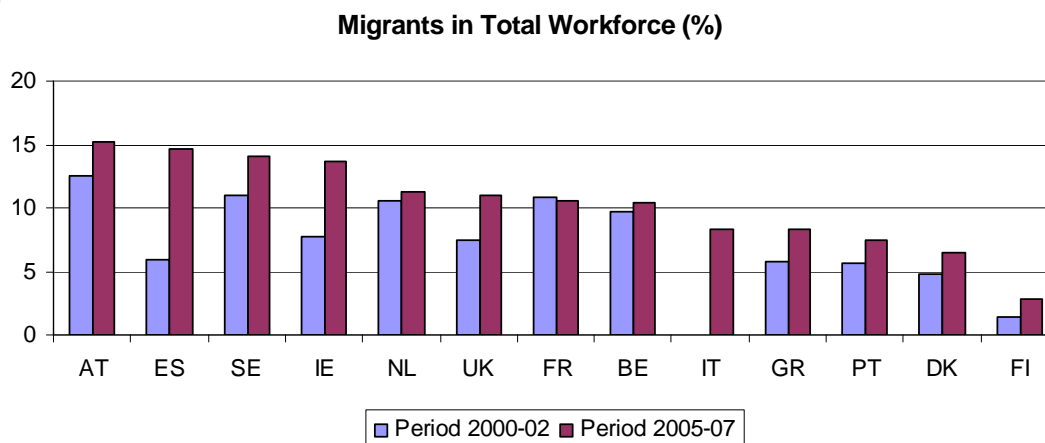
robustly – on the relationship between productivity growth and the shares of migrants and of high-skilled migrants in overall employment. There is also an analysis of the impact of different policy settings with respect to labour market access of migrants and to anti-discrimination measures. The latter have a significant positive impact on migrants' contribution to productivity growth. The analysis of regional impacts of migrants on value added and labour productivity growth builds on a prior extensive study analysing regional growth patterns (see Crespo Cuaresmo et al, forthcoming) which had narrowed down the range of robust explanatory variables through Bayesian econometric techniques. In this study the migration variables are added as explanatory variables and we find positive and significant effects of migrants' shares (and specifically of high-skilled migrants) on regional productivity growth. The analysis here still suffers from the limitations of being able to apply a satisfactory approach to determine causality.

## 2. Part I. Migrants in the EU-15 - allocations by country, industries and job types - descriptive analysis

### 2.1 Descriptive statistics from the LFS Dataset – overview of migrant workers in the EU-15

This study uses the Labour Force Survey (LFS) data provided by EUROSTAT for the EU15 member states over the period 2000-2007. Migrants, in this analysis, are defined as employees born abroad. The dataset provides information about the origin of a country's workers and will be explained in detail further below. Due to a lack of data for Germany the country had to be excluded. Also Luxemburg is excluded from most graphs because of its extreme outliers. This might be the case because of the very small size of the country, situated in the middle of Europe and due to its special tax benefits. The examination of the data set led to the exclusion of the year 2000 for Sweden. In that year all foreign workers were declared as domestic workers. A similar problem led to the exclusion of Italy's first period's values (we shall report mostly 3-year averages for the periods 2000-02 and 2005-07). We also had doubts about some data for the second period in Ireland. However, EUROSTAT assured us that some undeclared answers (with regard to place of birth) can be regarded as foreign workers – nevertheless, it is not possible to make sure from which countries these workers originate from.

Graph 1

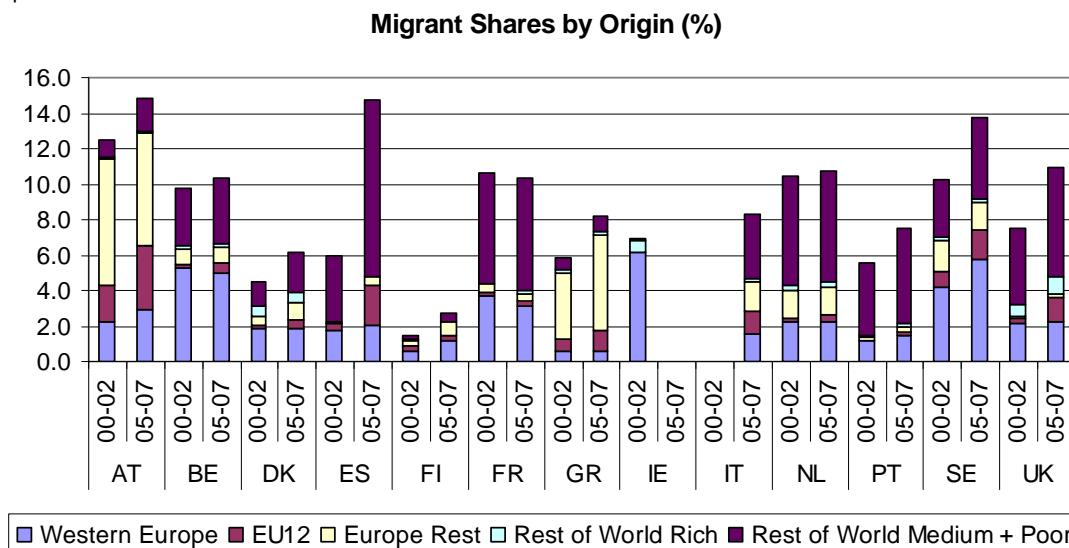


Graph 1 shows the shares of all migrants in the total workforce in percent. In order to reduce the impact of outliers, averages were calculated for two periods, 2000-2002 and 2005-2007. We were interested to look at the change in the shares over time. In 2004 ten new members entered the EU which might have an impact on migrants' shares and this explains the choice of the two periods.

Austria, France, the Netherlands, Sweden, and Belgium had the highest shares of migrants in the first period while Finland, Denmark, Portugal, Greece, and Spain had

shares below 6%. Spain and Ireland faced the most dramatic changes from period one to period two by 8.7 and 6.0 percentage points respectively. Great Britain, Sweden, Greece, and Finland had the second highest positive changes in a range from 3.5 to 2.3 percentage points. France is the only country which had a negative change in the share of migrants by -0.3 percentage points.

Graph 2

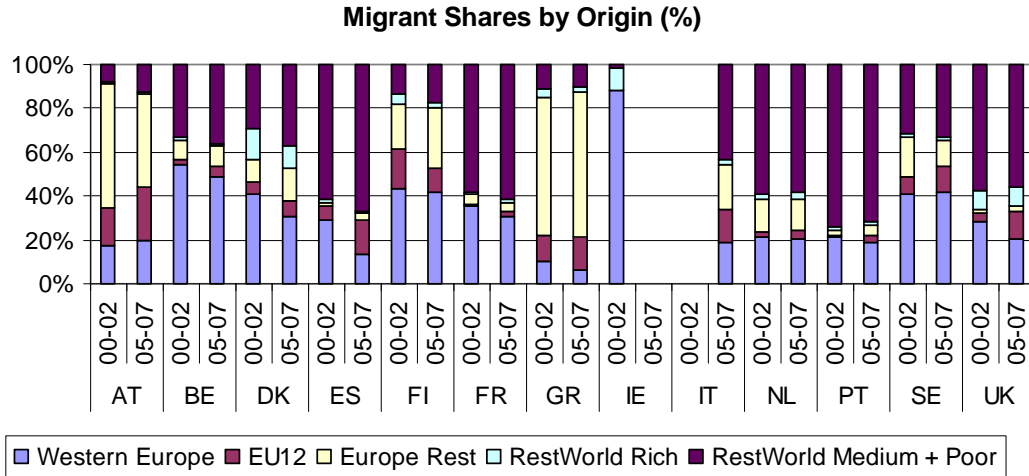


Graph 2 depicts the same shares as graph 1 but the migrants' country groups of origin are included to give an insight about the structure of where the foreign workers come from. The group Western Europe consists of the EU15 countries and the rich non-EU countries, Iceland, Switzerland, Norway, as well as the very small countries Andorra, Liechtenstein, Monaco, San Marino, and the Vatican City State. The group EU12 are the new EU members (joined either in 2004 or 2007). Europe Rest consists, as its name predicts, of the remaining European countries, including Russia and Turkey. The last two groups are aggregates of continents. North America and Australia are summarized in Rest of the World Rich while Africa, Asia, and Latin America constitute the group Rest of the World Medium and Poor.

Ireland, Belgium, and Sweden have the highest migrant shares from Western Europe while Greece has the lowest (around 0.5 percentage points in the total work force). Austria has the highest share of migrants from the New Member States (EU12) in both periods followed by Spain which experienced an increase from 0.4 to 2.3 percentage points over time. Again Austria and Greece have the highest shares of migrants from the Rest of Europe while Denmark, Spain, France, Portugal, and Great Britain have shares of 0.5 percentage points or below. The share of migrants from the Rest of the World Rich is almost negligible with the highest values in Great Britain and Denmark varying from 0.97 to 0.61 percentage points. While France and the Netherlands have a lot of foreign workers

from the Rest of the World Medium and Poor, Spain and Great Britain experienced a big increase over the two periods. Spain attracted a lot of workers from Africa due to its geographical position. An explanation for France's high share of migrants from the rather Poor Rest of the World is the influx of workers from former colonies. This is also the case for the Netherlands, Portugal, and Great Britain.

Graph 3



Graph 3 presents a different approach to compare the origin of the foreign workers as it gives the percentage shares of the groups adding up to 100%. Now the groups are directly comparable in relative numbers, not as before in percentage points of the total labor force. However this picture is similar to interpret as was done above.

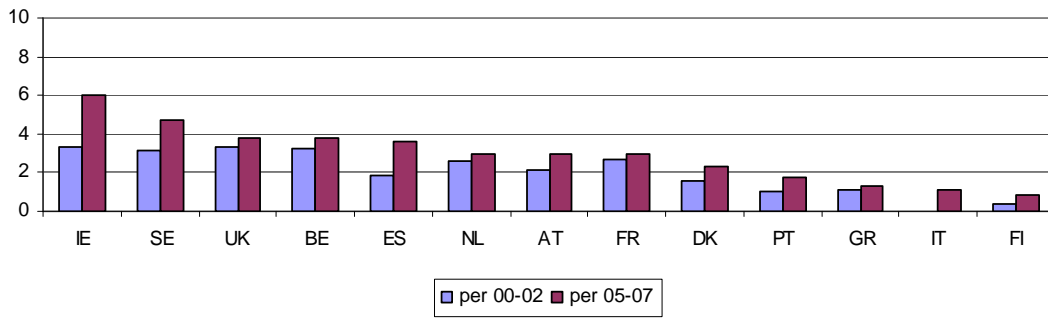
## 2.2 Migrants' skills

LFS statistics allow a distinction of workers 'skills' by ISCED (International Standard Classification of Education) categories which amount to educational attainment levels. We shall use this classification to distinguish 3 'skill groups', a 'low skill' group which includes workers which have only achieved educational levels less than a completed secondary school education, a middle group which has completed a secondary school degree but not more, and a 'high skill' group which has completed a tertiary degree (at university or college level).<sup>1</sup> It is generally regarded that cross-European comparisons can be made at that level of aggregation but not below that (see also European Commission, 2007, EU Skills Study).

<sup>1</sup> More precisely, the 'low skill' group includes ISCED categories 0/1/2; the 'medium skill' group ISCED categories 3/4; and the 'high skill' group ISCED categories 5/6.

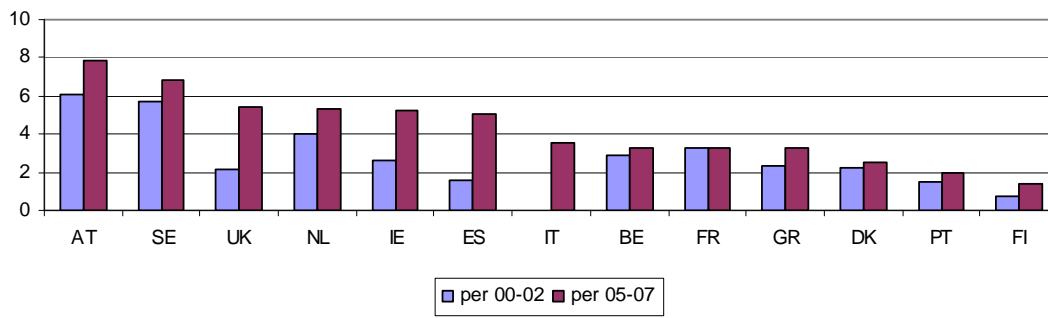
Graph 4

**Share of high skilled migrants in total workforce (%)**



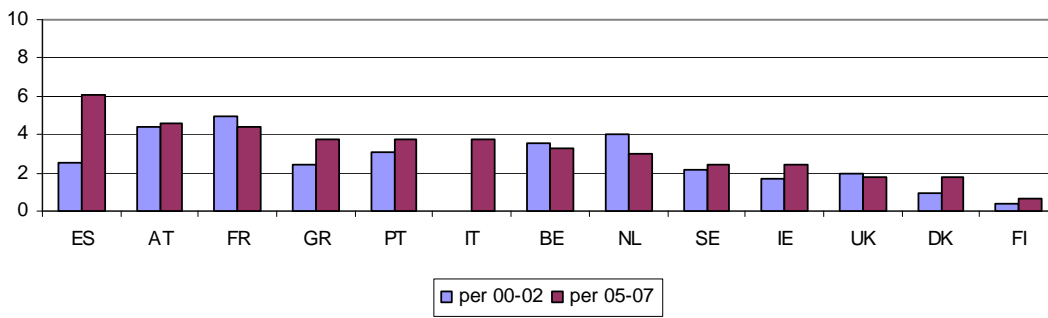
Graph 5

**Share of medium skilled migrants in total workforce (%)**



Graph 6

**Share of low skilled migrants in total workforce (%)**



Starting with the shares of high skilled migrants (i.e. those with completed tertiary degrees) in the total workforce, these are shown in graph 4. Great Britain, Belgium, Ireland, and Sweden have high initial shares while in Greece, Portugal and Finland these range around 1% or below. All countries faced an increase in high skilled foreign workers. Especially Ireland and Sweden have experienced dramatic positive changes making them the leading countries in this group.

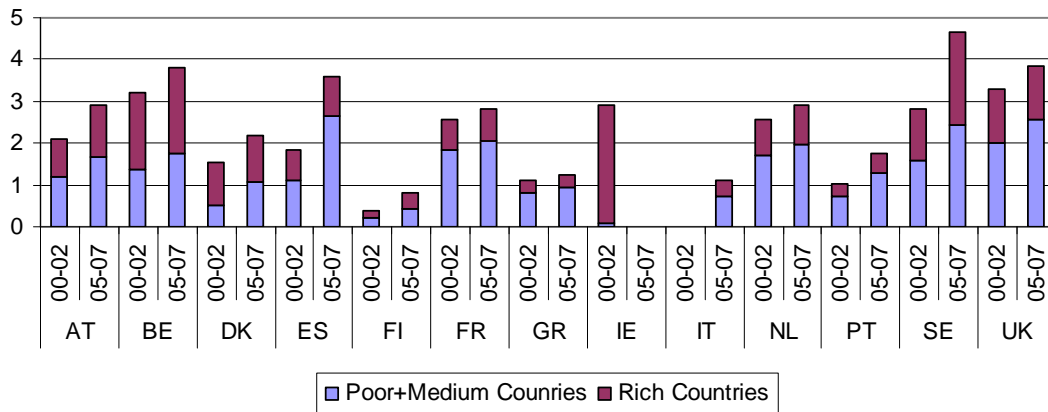
The graphs 5 and 6 show the shares of medium skilled and low skilled migrants per country. Austria has a high share of medium skilled foreign workers compared to its high and low skilled ratios. Spain experienced very big increases from period 1 to period 2 across all three skill groups.

Graphs 7 to 9 show the shares of high skilled, medium skilled, and low skilled migrants in the total workforce by origin while the graphs 10 to 12 shows the migrants by region of origin adding up to 100%. Unfortunately it is not possible to distinguish between the five regions of origin as was done before as disaggregation by skill groups as well as by countries of origin is constrained by the size of LFS samples. Therefore only two groups of origin are shown, to provide larger samples. The first group, the group of Rich Income Countries, includes the EU15, the rich non-EU countries, North America, and Australia. The second group, Poor + Medium Income Countries, consists of the New Member States (EU12), Rest of Europe, Africa, Asia, and Latin America.



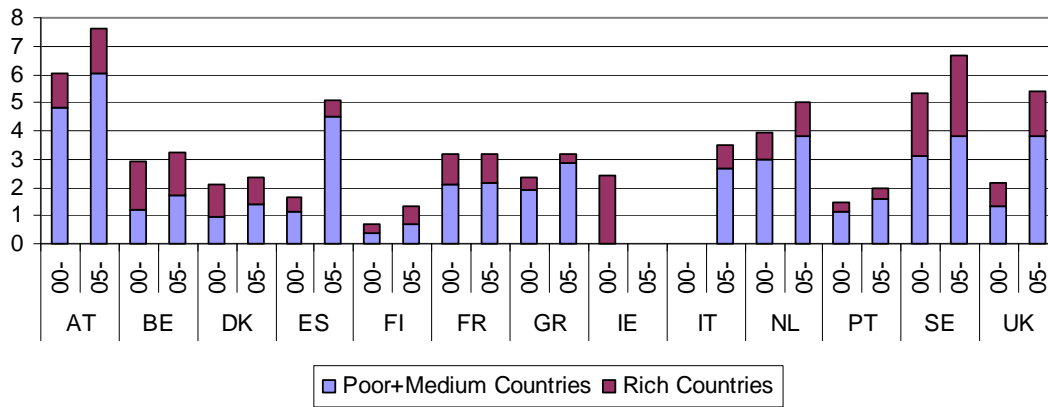
Graph 7

**High Skilled Migrants in Total Workforce by Origin, 2005-07 (%)**



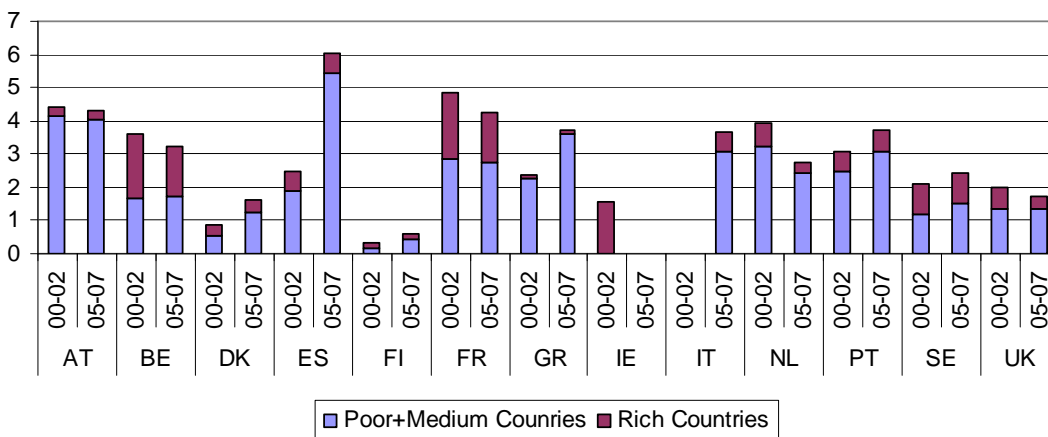
Graph 8

**Medium Skilled Migrants in Total Workforce by Origin, 2005-07 (%)**



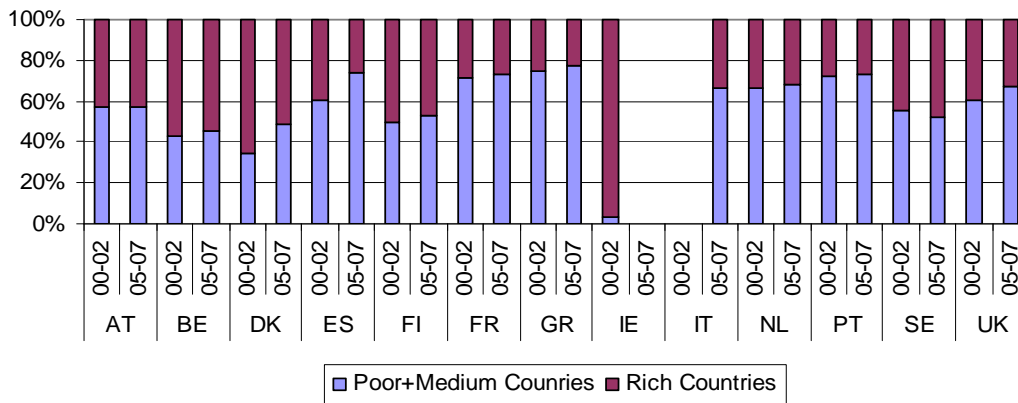
Graph 9

**Low Skilled Migrants in Total Workforce by Origin, 2005-07 (%)**



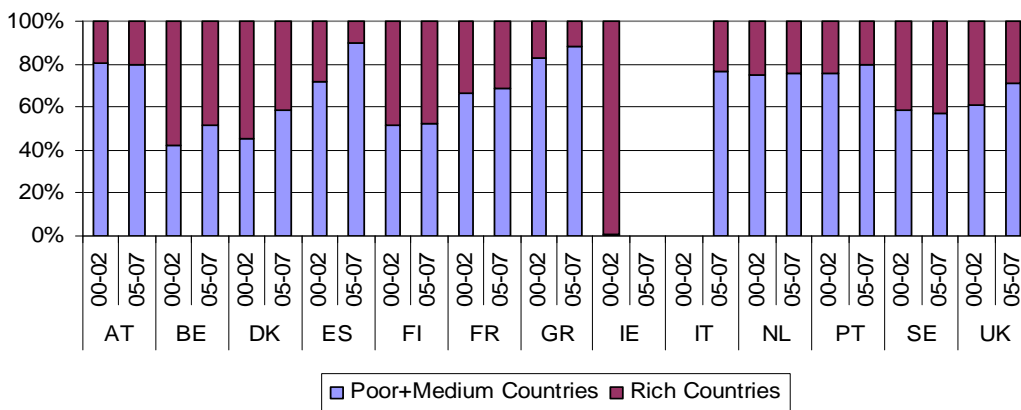
Graph 10

**High Skilled Migrants in Total Workforce by Origin, 2005-07 (100%)**



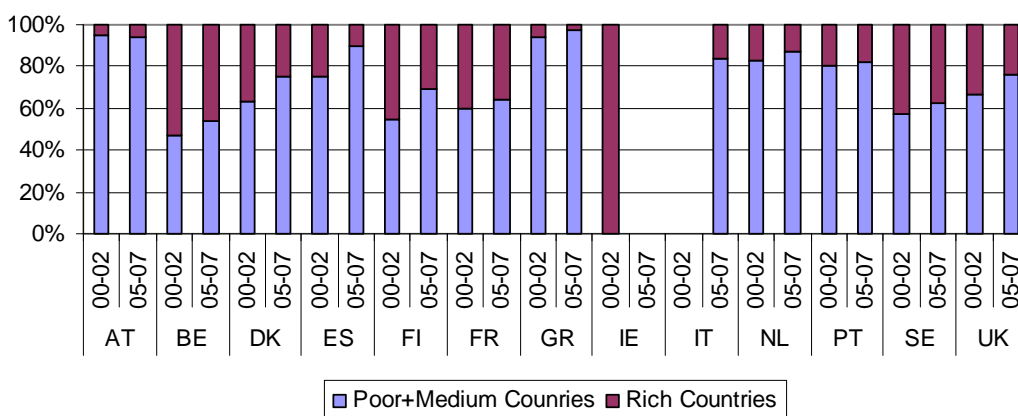
Graph 11

**Medium Skilled Migrants in Total Workforce by Origin, 2005-07 (100%)**



Graph 12

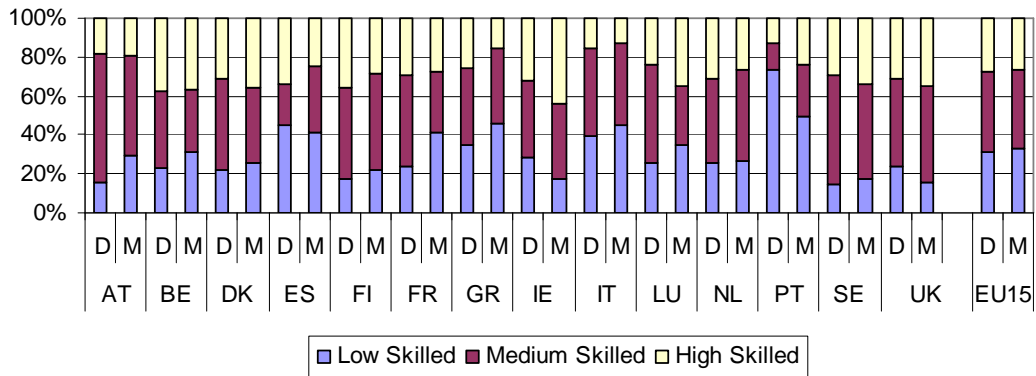
**Low Skilled Migrants in Total Workforce by Origin, 2005-07 (100%)**



In most countries the larger share of even the high skilled migrants in total employees comes from the Poor and Medium Income Countries. This is not true for Belgium, Denmark, and Ireland in the first period. The most likely explanation is that these countries have rich neighbouring countries eager to work there. When looking at the evenly distributed high skilled migrant workers in Denmark, Finland, and Sweden, this hypothesis seems to hold also for the Scandinavian countries more generally. Ireland has a share of 2.8 percent of migrants in the total workforce from Rich Source Countries (data here are restricted to the first period) compared to 0.1 percent from the Poor and Medium Countries – this means that almost 97% of the high skilled migrants come from Rich Income Countries. However, a range of economies (Spain, France, Greece, Portugal, Italy, Netherlands, UK) source a larger share of their migrants with tertiary degrees from Middle and Poor Income countries.

Graph 13

**Skill Composition of Migrants and Domestic Workers by Country (%)**



Graph 13 shows the skill composition of domestic and migrant workers by country as well as the structure of the EU15 on average over the period 2005-2007. Worth noticing is that Austria, Belgium, Denmark, Finland, France, Greece, Italy, Luxemburg, the Netherlands, and Sweden have relatively more low skilled migrants than low skilled domestic workers. Spain, Ireland, Portugal, and the United Kingdom show a reverse picture. There are relatively more low skilled domestics than migrants. It is also interesting to point out countries in which the share of high skilled migrants is greater than the share of high skilled domestic workers. This is true for Denmark, Ireland, Luxemburg, Portugal, Sweden, and the United Kingdom. Spain, Finland, Greece, Italy, and the Netherlands have relatively more high skilled domestic workers than foreign workers while Austria, Belgium, and France are almost equally distributed.

Next we want to check on a comparative basis which skill group is more or less represented in a country's labour force relative to what happens at the EU15 level. For this purpose we calculate an 'ease of entry' indicator (y) by country and for each skill group of migrants. This is done by calculating the shares of migrants in the total workforce (mig) by

country (i) and by skill group (j); then these shares were divided by the share of each skill group's in the EU15 migrant population (EU15). The same was done for the shares of all migrants (the sum of all skill groups) by country in the EU15 as a whole. As a last step, those two shares were differenced, as formula (1) shows and multiplied by 100. The indicators can then be interpreted as showing the relative over- or under-representation (in percentage terms) of a particular skill group in a country's migrant labour force compared to the EU15 as a whole.

$$y = [(mig_{ij} / mig_j^{EU15}) - (mig_i / mig^{EU15})] * 100 \quad (1)$$

These indicators are presented in Graphs 14a-14c. The graphs show, for example, that high skilled and low skilled migrants are underrepresented amongst Austria's foreign labour force compared to the EU15 average, while there are many more medium skilled migrants in Austria than in the EU15 average. Denmark and Finland have migrant shares ranging around the EU15 average in each skill group while Ireland, Sweden, and Great Britain show an 'over-representation' of medium- and high-skilled migrants and an 'under-representation' of low-skilled migrants relative to the EU15.

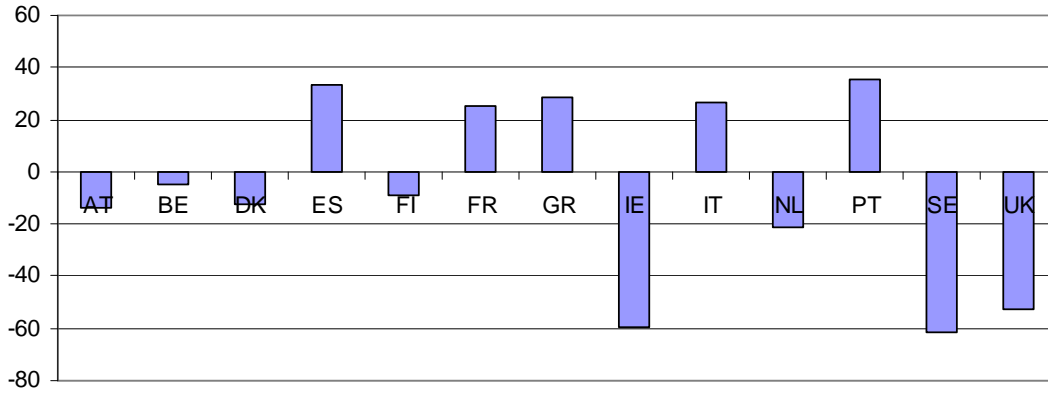
Whether 'ease of entry' is the right word to use for these indicators is debatable; however, the indicators show the differences in the skill composition of the migrant stocks in particular countries relative to the EU15 controlling for the relative sizes of overall migrant shares in a particular country. There are, of course, multiple causes for differences in skill composition of the migrant labour force in different countries which include supply side (which countries are migrants mainly coming from), demand side (which skills are in demand; which openings does the labour market provide for migrants) and policy/regulatory frameworks (e.g. which types of migrants get more easily work permits). It is the consideration of the last two factors which made us use the concept of 'ease of entry'.

Graph 14

### 'Ease of Entry/Relative Attraction' Indicators

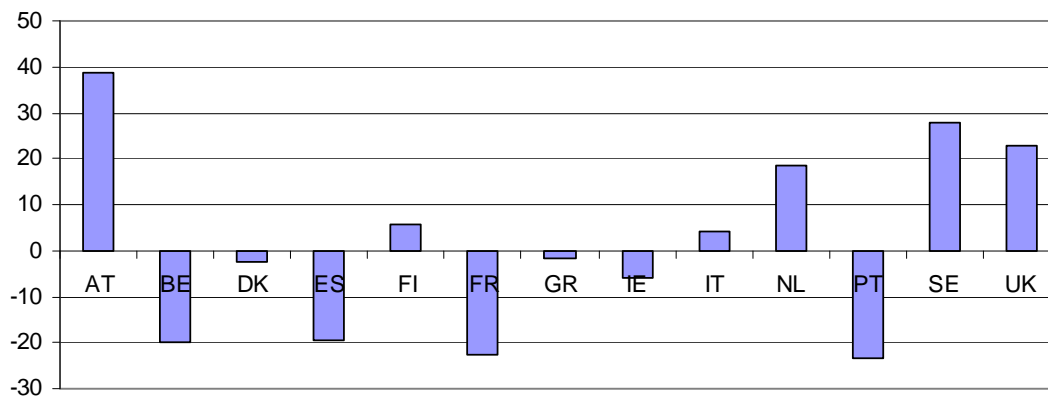
Graph 14a

#### Low Skilled Migrants, 2005-07 (%)



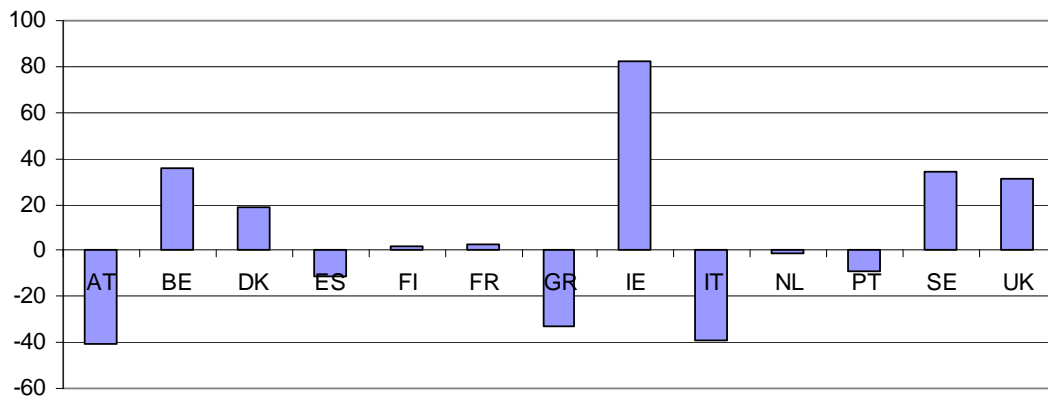
Graph 14b

#### Medium Skilled Migrants, 2005-07 (%)



Graph 14c

#### High Skilled Migrants, 2005-07 (%)



### 2.3 Migrants' allocation across industry groupings

In the following we use an industrial break-down and group industries in terms of three clusters depending upon skill-intensity. We then check the relative allocation of migrant workers across these clusters and also analyse their qualifications compared to those of domestic workers in these clusters.

Let us start with the definition of the industry clusters: The graphs 15a to 15c depict the shares of high educated workers in the total workforce per NACE Rev. 1 (2 digits) industry as means over the period 2005-07. The industries are grouped into 3 clusters where graph 15a shows the group of industries with the highest shares of high educated workers. Thus, this industry cluster will be called *high skill industries* from now on. The graphs 16a and 16c show the group of industries with intermediate shares of high skilled workers (*medium skill industries*) and the group of the lowest shares (*low skill industries*). Each of these industry groupings accounts for approximately 33% of the total workforce in the EU15 which explains why they include different numbers of NACE Rev. 1 industries. Table A.4 in the appendix provides a complete list of the industries in these clusters including their shares of workers in total employment.

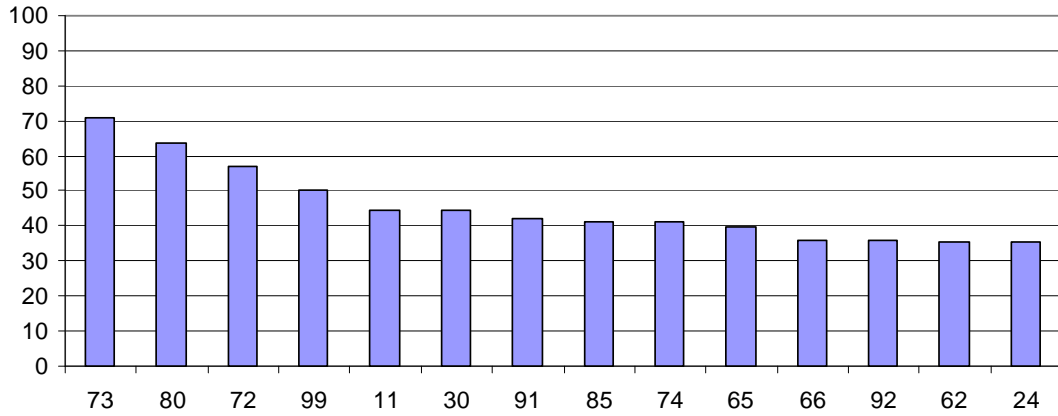
We start with analysing the distribution of migrants across the three industry groupings. In Graphs 17a to 17c we can see the shares of migrants and of domestic workers employed in the three different industry groupings (hence these shares must add up to 100% across industry groups). The distribution of workers across industry groupings reflects the composition of industries in a country's economy, i.e. whether high- or medium- or low-skill industries are more strongly represented in a country's economy, and the graphs also show whether the distribution of domestic workers as compared to migrants across these industry groupings is different or rather similar.

Graph 15

**Share of High Skilled Workers in Total Industry's Workforce, 2005-07**

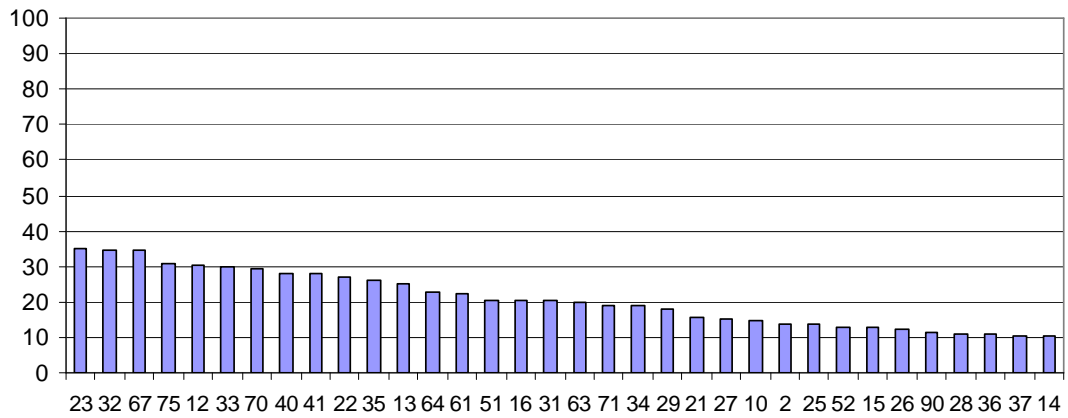
Graph 15a

**High skill industries**



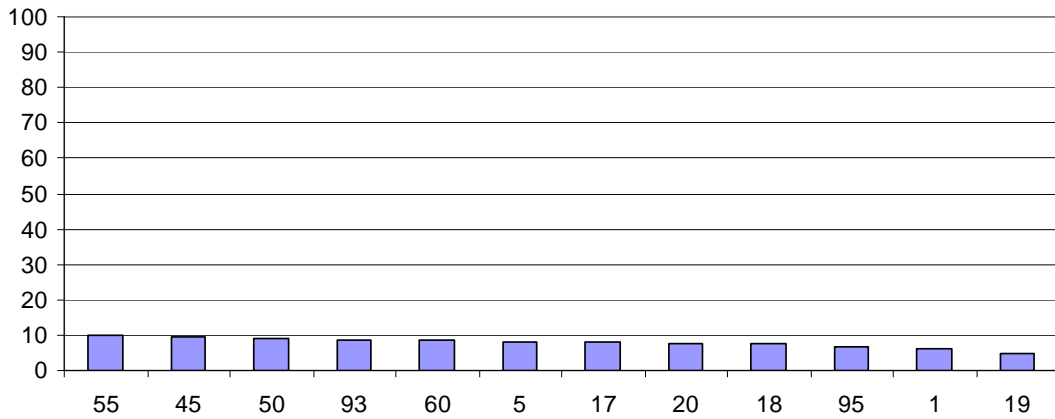
Graph 15b

**Medium skill industries**



Graph 15c

**Low skill industries**

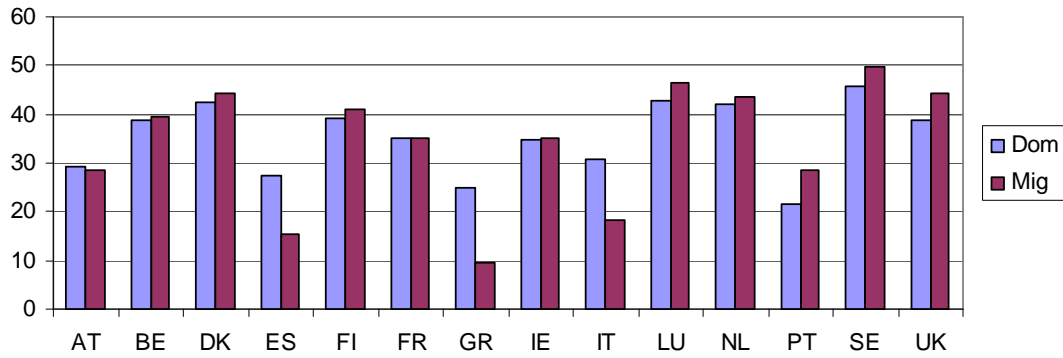


Graph 16

### Shares of migrants and shares of domestic workers in

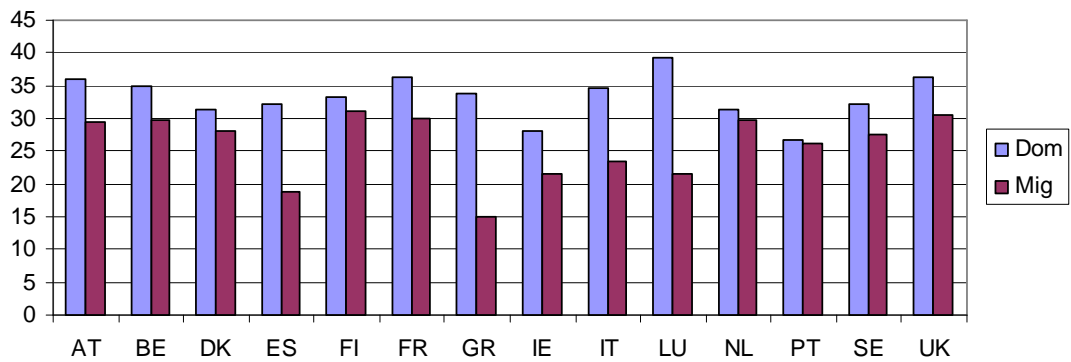
Graph 16a

#### High skill industries



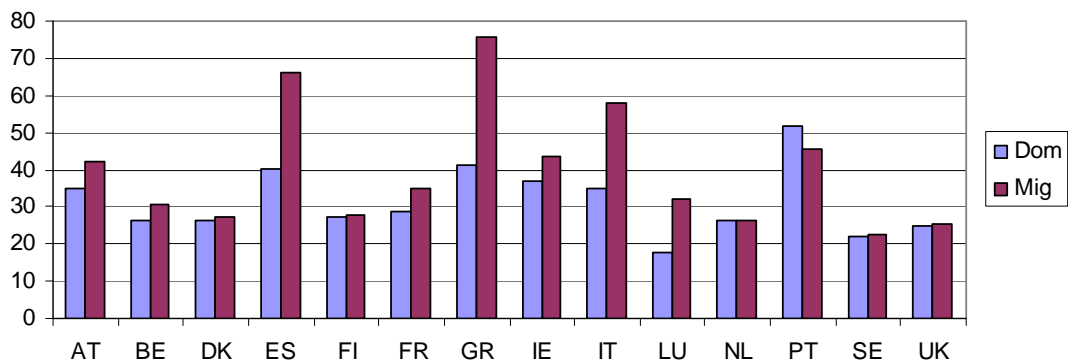
Graph 16b

#### Medium skill industries



Graph 16c

#### Low skill industries





Graphs 17a to 17c focus on the distribution of high skilled migrants (i.e. migrants with completed tertiary degrees) and of high skilled domestic workers across the three industry groupings. Hence we can see in which industries high skilled personnel is mainly employed and, again, whether there are differences in the allocation of high-skilled migrants as compared to high-skilled domestic workers across the three industry groupings.

The first thing we see from these graphs is that the industry classification (which has been constructed from using data on the allocation of high-skilled employees in total across the EU15 economy as a whole, also works on the whole also for individual countries. I.e. with few exceptions (e.g. Greece and Portugal) there is a larger share of high skilled migrants and of domestic workers employed in the high-skill industries than in the medium- or low-skill industries also at the individual country level.

Secondly, in many countries (Austria, Belgium, Denmark, Finland, France, Sweden, UK) the relative allocation of highly skilled personnel across the industry groupings is not very different across migrants and domestic workers. Exceptions are Spain, Greece, Ireland, Italy, Portugal, i.e. the Southern European economies, where there is a lower share of high skilled migrants employed in the high-skill industries compared to domestic workers and, symmetrically, a higher share in low skill industries. The opposite is the case in France, Luxembourg and the UK where high skilled migrants are relatively more strongly allocated in high-skill industries.

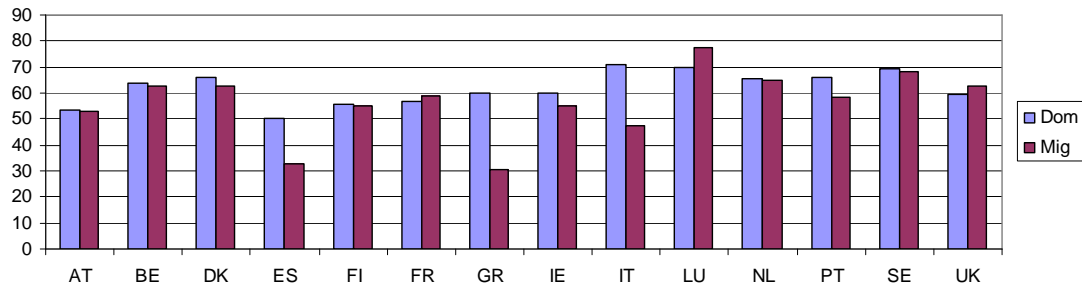
Finally, in graphs 18a to 18c we can see how important high-skilled workers (domestic and migrant) are in the total labour forces of the three industry groupings. Here we can see, for example, the very low share of high skilled personnel (migrants and domestic workers) in Austria, Spain, Greece and Portugal in the high-skill industries which reflects the relatively low share of high-skilled in the overall labour force in these countries. The shares of high-skilled in countries like Belgium, Denmark, Finland, France, Ireland, Netherlands, Sweden and the UK are between 10 to 15 percentage points higher than in the first group of countries and Denmark, Ireland, Luxembourg, Portugal, Sweden and Great Britain benefit from a strong boost to the presence of high-skilled personnel in high-skill industries through the stronger presence of high-skill migrants in these industries than that of domestic workers.

Graph 17

**Industry allocations of high skill migrants and high skill domestic workers**  
 (in % of total high skill migrants and high skill domestic work forces)

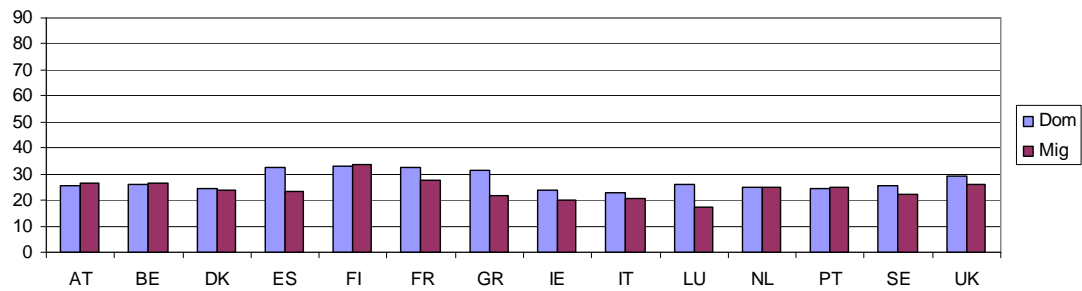
Graph 17a

**High skill industries**



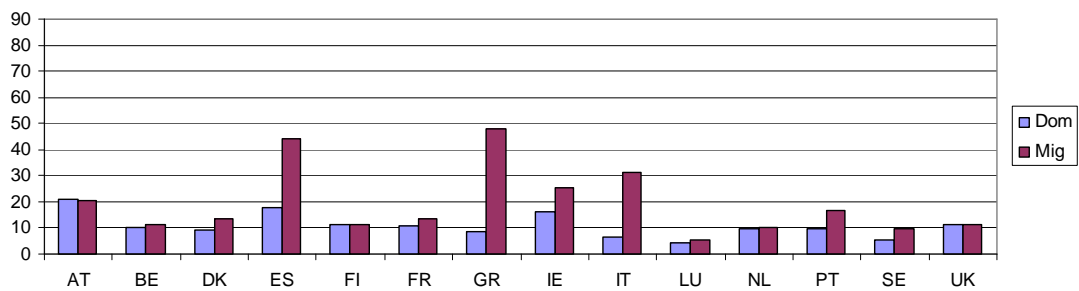
Graph 17b

**Medium skill industries**



Graph 17c

**Low skill industries**



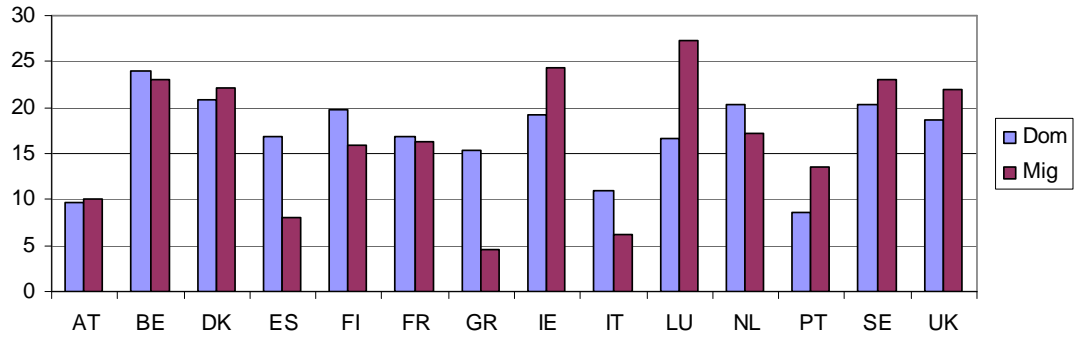
Graph 18

**Industry allocations of high skill migrants and high skilled domestic workers**

(in % of total migrants and domestic work forces)

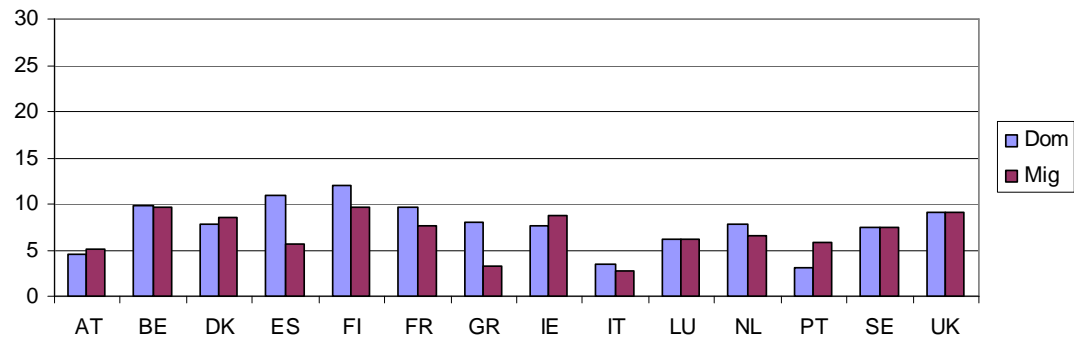
Graph 18a

**High skill industries**



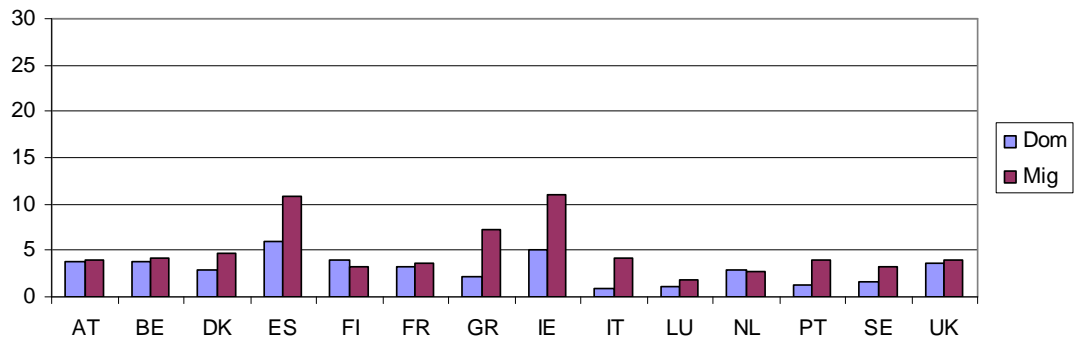
Graph 18b

**Medium skill industries**



Graph 18c

**Low skill industries**



## 2.4 Skills-Jobs Mismatch

In this section we shall address the question of whether there is a difference in the match between skills and occupations between migrants and domestic workers. To be more specific, when the qualification of a worker does not match the required skills of a job we speak either of over- or under-qualification. The LFS dataset's offers also information by ISCO (International Standard Classification of Occupations) categories regarding the occupation a person is employed in. At the relatively aggregate level these occupations range from 0 to 9 (see Table 1), and in another exercise (see Huber et al, 2009, p.82; see also OECD, 2007), these occupations were grouped into three different skill clusters, as reported in Table 1. The occupation group 0 (armed forces) was dropped from our analysis as it consists of a variety of different skill positions which cannot be adequately distinguished. In addition only a very small fraction of people is employed in these jobs. Regarding the overall occupation-skill-groupings, we should emphasise that each such grouping requiring positions contains a variety of skill levels but the classification reflects the fact that the jobs clusters require relatively more or less people with higher or lower educational attainment levels.

Table 1

### Correspondence of major job groups (ISCO-88) and required skill levels (ISCED-97).

ISCO-88 Major Groups	Job types	Educational Attainment levels
1. Legislators, senior officials and managers	High Skilled	ISCED 5,6
2. Professionals		ISCED 5,6
3. Technicians and associate professionals		ISCED 5,6
4. Clerks	Medium Skilled	ISCED 3,4
5. Service workers and shop and market sales workers		ISCED 3,4
6. Skilled agricultural and fishery workers		ISCED 3,4
7. Craft and related trade workers		ISCED 3,4
8. Plant and machine operators and assemblers		ISCED 3,4
9. Elementary Occupations	Low skilled	ISCED 0,1,2
(0. Armed forces)	No assignment	

Source: Huber et al. (2009).

The next step was to calculate the shares of high, medium, and low skilled migrants in the employed migrant labour force in the various 'job types' (i.e. low, medium, high skilled) and the same was done for domestic workers. Once this was done, a direct comparison of these ratios (shares) allowed one to see whether migrants were 'under-' or 'over-qualified' relative to domestic workers in particular job types<sup>2</sup>. This is the analysis which shall pursue in the following.

<sup>2</sup> More precisely, the two ratios were subtracted from 1.0 and then multiplied by 100 to get a figure representing the over or under qualification of migrants in a particular job-type. This gives 9 different shares for each country in our analysis. Thus, a positive number has to be interpreted as the percent of migrants relatively to domestic workers who are over qualified, while a negative number shows an 'under-qualification' of migrants relative to domestic workers in that particular type of job. Sh1occ3, for example, is the share of the high educated migrants relatively to high educated domestic workers who are employed in low skilled jobs. All other shares have to be interpreted in the same way.

Table 2

**Job mismatching - over- / under representation of migrants  
relatively to domestic workers, 2005-07**

	<b>overqualified</b>		
<b>country</b>	<b>Sh1occ3</b>	<b>Sh1occ2</b>	<b>Sh2occ3</b>
AT	0.38	0.49	-0.30
BE	0.10	0.30	-0.27
DK	-0.10	0.08	-0.13
ES	-0.34	-0.24	1.45
FI	0.00	0.29	-0.10
FR	0.31	0.68	-0.48
GR	-0.28	0.04	0.45
IE	-0.52	-0.32	0.57
IT	-0.24	-0.09	0.50
NL	-0.19	-0.12	0.35
PT	-0.22	-0.26	2.34
SE	0.12	0.04	-0.22
UK	-0.32	-0.24	0.30
	<b>correctly qualified</b>		
<b>country</b>	<b>Sh1occ1</b>	<b>Sh2occ2</b>	<b>Sh3occ3</b>
AT	0.56	-0.16	1.20
BE	0.55	-0.23	1.65
DK	0.34	-0.16	2.29
ES	-0.18	0.52	1.02
FI	0.06	-0.15	1.16
FR	0.40	-0.36	1.02
GR	-0.18	-0.10	4.83
IE	-0.57	-0.07	1.78
IT	0.01	0.04	6.78
NL	-0.09	0.08	0.65
PT	-0.62	1.32	
SE	-0.06	-0.13	2.17
UK	-0.48	0.05	0.47
	<b>under qualified</b>		
<b>country</b>	<b>Sh2occ1</b>	<b>Sh3occ2</b>	<b>Sh3occ1</b>
AT	-0.27	0.30	0.37
BE	-0.12	0.18	-0.02
DK	-0.22	0.93	0.08
ES	0.23	0.02	-0.02
FI	0.59	0.20	-0.24
FR	-0.15	0.06	0.01
GR	-0.08	0.43	0.07
IE	-0.33	0.83	0.30
IT	-0.16	0.89	0.24
NL	0.05	0.05	-0.02
PT	0.24	2.21	0.36
SE	-0.18	1.29	0.13
UK	0.19	0.32	-0.02

*Note:* The numbers in this table are to be interpreted in the following way: Sh1occ3 refers to the relatively higher (or lower) share of migrants – compared to domestic workers - with tertiary degrees employed in jobs which have the lowest educational requirements. If the number is positive it shows that migrants have a relatively higher share of such workers in these jobs than domestic workers, if the number is negative it is the other way round. Multiplying the number by 100 gives the percentage differences in such over- or under-qualification between migrants and domestic workers in the respective types of jobs. Sh1, Sh2, Sh3 refer to the high- medium-, low-qualified workers, and occ1, occ2, occ3 to the ranking of jobs in terms of requiring, respectively, the highest, medium or lowest educational requirements.

The graphs 19 and 20 should give the reader an insight of how the migrants and domestic workers are distributed among the different occupation-skill-groups over the periods 2000-02 and 2005 to 2007. To make the graphical analysis easier, the original shares were transformed into logs, to range around zero. The zero line, in this case, would refer to an equal representation of migrants and domestic workers in terms of educational attainment levels in a specific job. This approach will be used throughout all graphs in this section to obtain a picture of relative jobs-skills mismatching of migrants relative to domestic workers. Especially the issue of relative 'over-qualification' of migrants is an important issue as it is a form of "brain waste" in the sense that a migrant worker is employed in a particular job which does not require his or her higher level of education (always compared to the domestic labour force).

Of course, skills-jobs mis-match analysis is a difficult issue and cannot simply be studied by comparing formal educational attainment levels (i.e. primary, secondary and tertiary degrees) as, in the first instance, the detailed content of the educational curricula can be quite different and, furthermore, there are other than 'formal' qualifications (e.g. language) which might be very important distinguishing characteristics between different workers (migrants and domestic workers, or migrants from different places of origin). Nonetheless, given that we do not have information other than formal educational qualifications we shall pursue the analysis of 'over-qualification', 'under-qualification', and 'correct qualification' on that basis.

Let us start with an interpretation of the results shown in graphs 19a-19c and 20a-20c in which the relative skills-jobs allocations of migrants relative to domestic workers is shown for periods 2000-02 and 2005-07 respectively. We shall select only a few of the most striking facts:

- First, the pattern is relatively persistent over time, hence we shall focus on the most recent period depicted in Graphs 20a-20c.
- When we look at the most striking feature of 'over-qualification', we see that the most pervasive feature across countries is that a lot of medium-educated migrants work in low skill jobs (Sh2occ3); in two countries, Austria and France we also find a rather strong relative allocation of highly educated migrants to work in medium- and even in low-skill jobs (Sh1occ2 and Sh1occ3). Both these two types of features can be interpreted medium- or high-skill migrants find it difficult to get either their qualifications properly recognised or that they miss other than formal qualifications or that there are indeed barriers to entry (temporary or longer-term) which bar them from doing the jobs for which they would otherwise be formally qualified.
- As regards, 'correct qualification', i.e. migrants working in exactly those jobs for which they are qualified, we see that the most pervasive feature is that many more 'low qualified migrants' work in 'low-skill jobs' than is the case for low skilled domestic workers (see Sh3occ3); this can be interpreted as a rather strong

substitution effect of low-skilled migrants for low-skilled domestic workers in these types of jobs.

- In terms of 'under-qualification' we find that in many countries we find 'low skill migrant workers' being strongly represented in 'medium skill jobs' (Sh3occ2). This could be seen as a type of complementarity in particular jobs where low-skill activities are carried out by migrants in jobs which are predominantly defined as 'medium skilled jobs' (think about the construction jobs or jobs in the services sectors).

The following sets of graphs (21-26 and 27-35) breaks down the analysis conducted above for the aggregate economies into sub-groups of industries:

Graphs 21-26 splits up the economy into manufacturing industries (NACE Rev. 1 industries 15 to 37) and business service industries (NACE Rev. 1 industries 50 to 74) and then conducts the same type of analysis as before but for these two sub-groups of industries.

Graphs 27-31 uses the industry breakdown already adopted in section 2.3 into 'high-medium- and low-skill industries' (see previous graphs 15a-15c) and conducts the analysis for these sub-groups of industries.

We shall not go over a detailed examination of these results, but let us pick up one feature as an example for this type of analysis:

- It is interesting that quite a few countries (Austria, Belgium, Denmark, Finland, France, Netherlands) rely over-proportionately (compared to domestic workers) on migrant workers with tertiary degrees to work in high-skill jobs in high-skill industries. This is an important feature which could be explained by an important 'skills need' in high-skill industries which is closed - at least to some extent - by highly trained migrants.

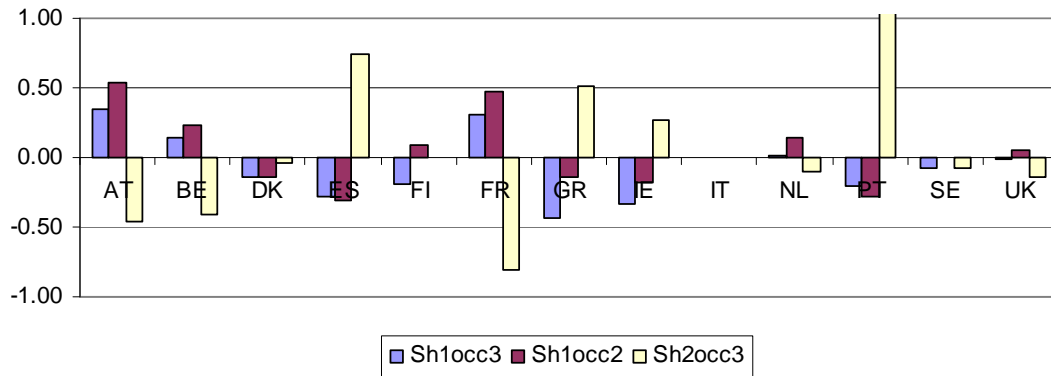
We leave the rest of the analysis of specific country and industry features to the reader.

Graph 19

**Over-/under-representation of migrants  
relatively to domestic workers, average 2000-02**

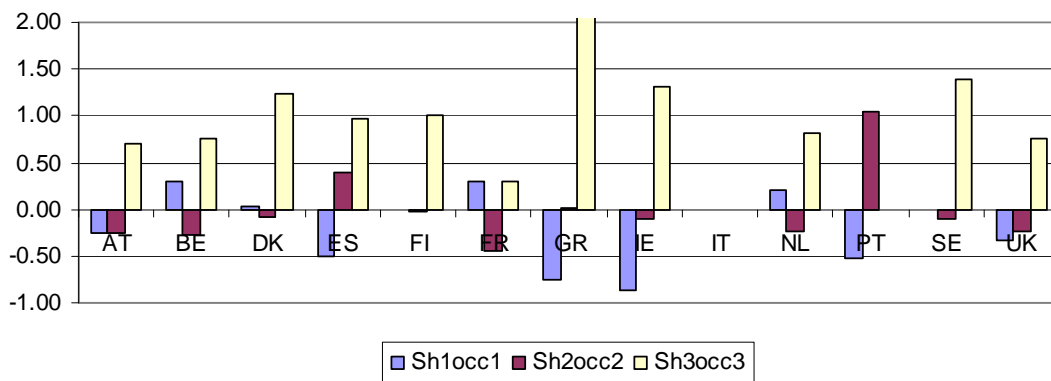
Graph 19a

**Over qualification**



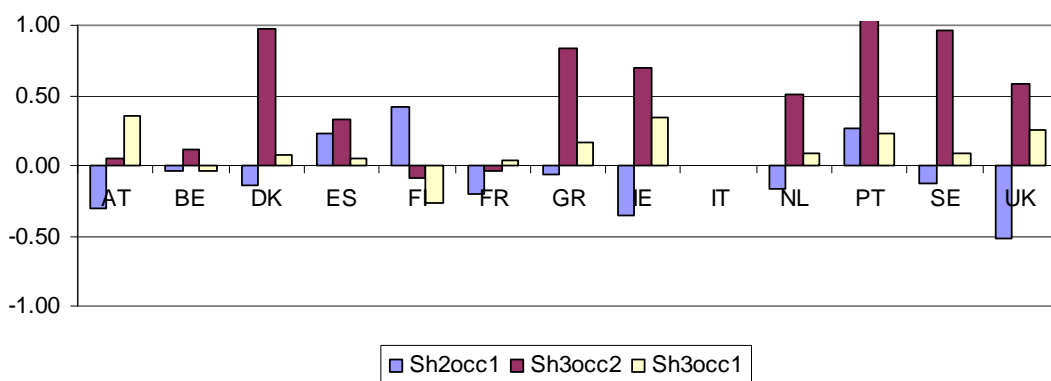
Graph 19b

**Correctly qualified**



Graph 19c

**Under qualification**



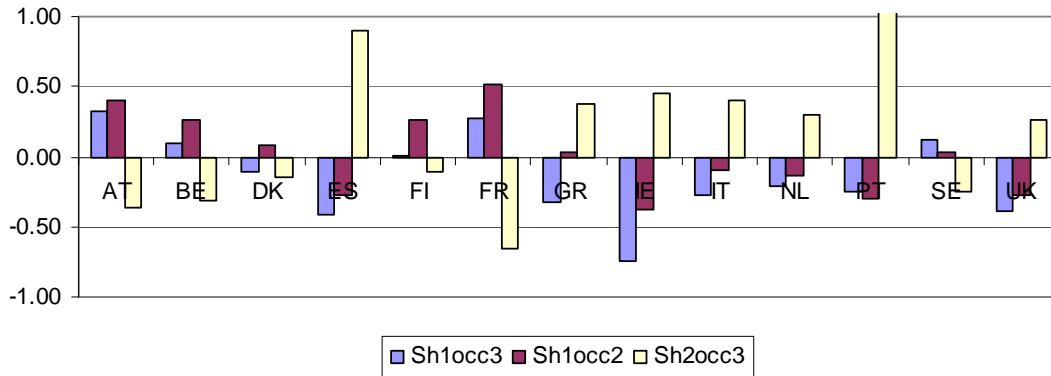


Graph 20

**Over-/underrepresentation of migrants  
relatively to domestic workers, average 2005-07**

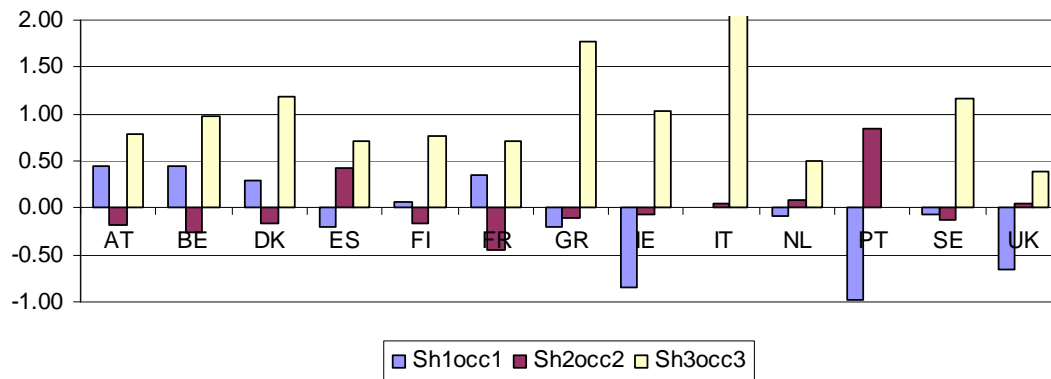
Graph 20a

**Over qualification**



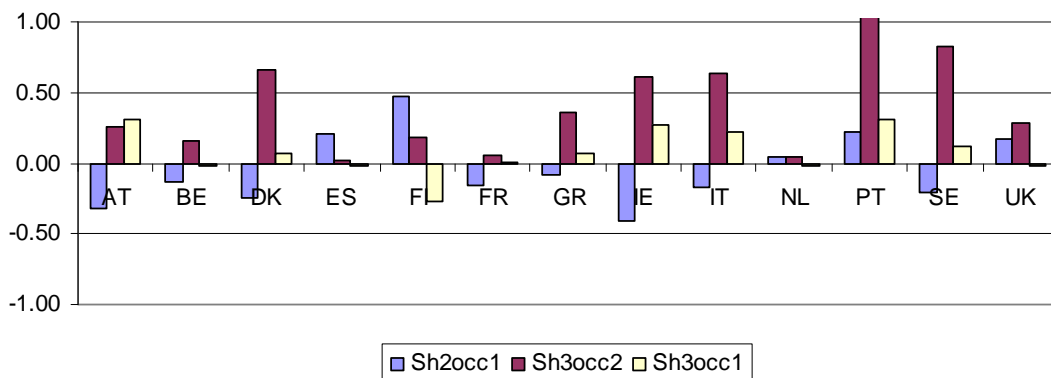
Graph 20b

**Correctly qualified**



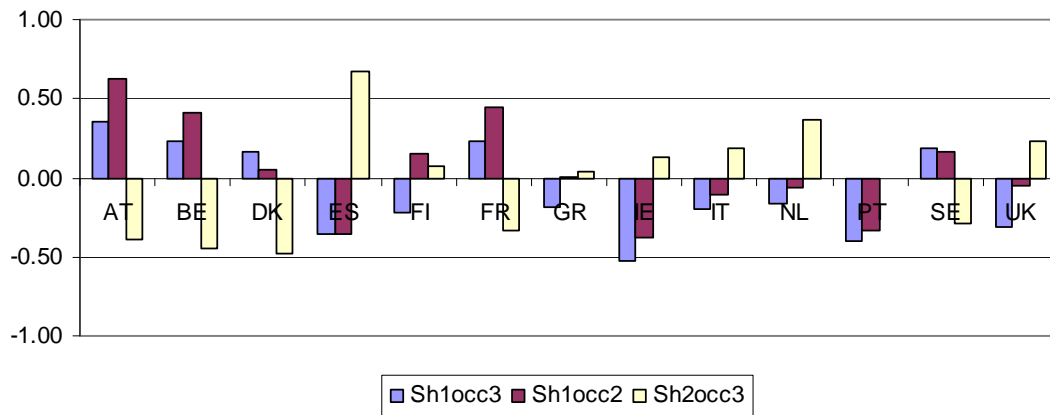
Graph 20c

**Under qualification**



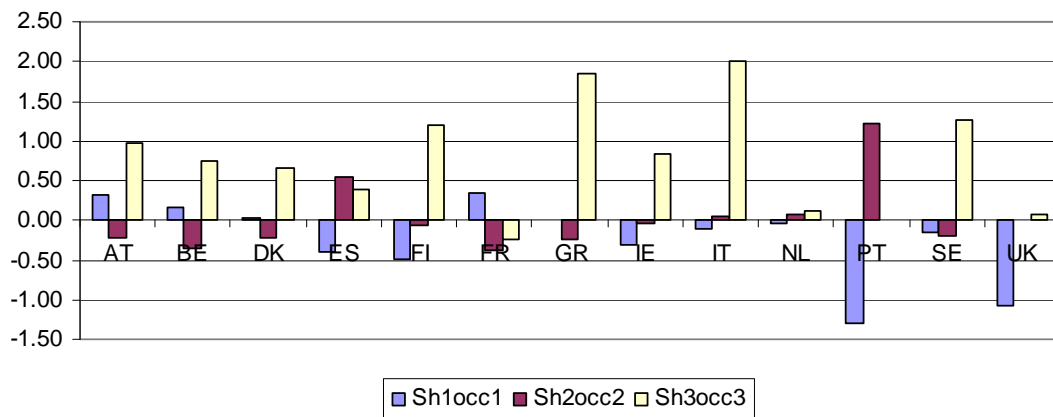
Graph 21

**Over qualification in manufacturing industries, 2005-07**



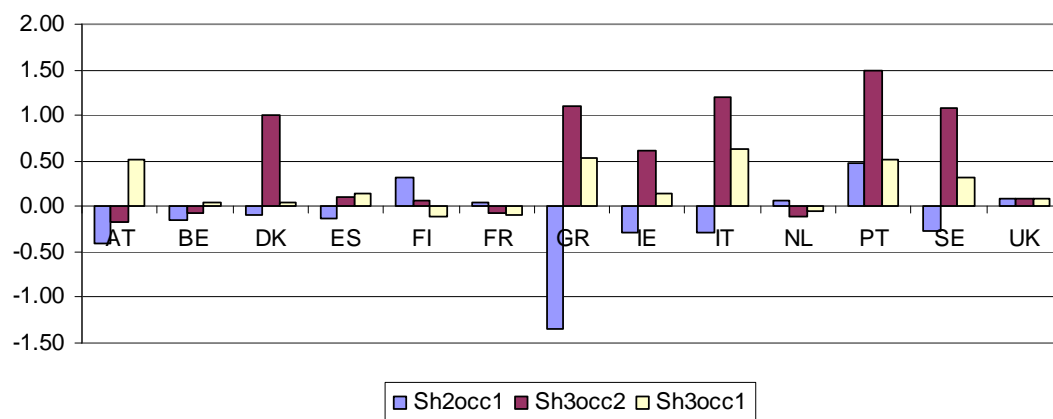
Graph 22

**Correct qualification in manufacturing industries, 2005-07**



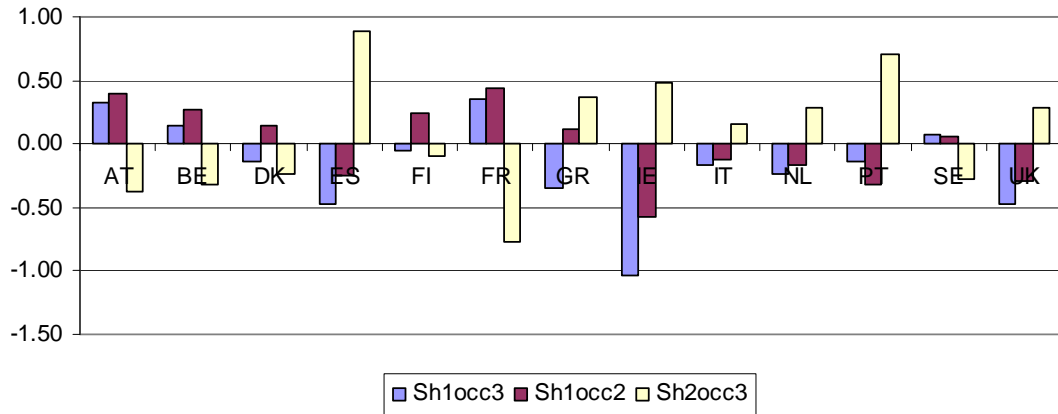
Graph 23

**Under qualification in manufacturing industries, 2005-07**



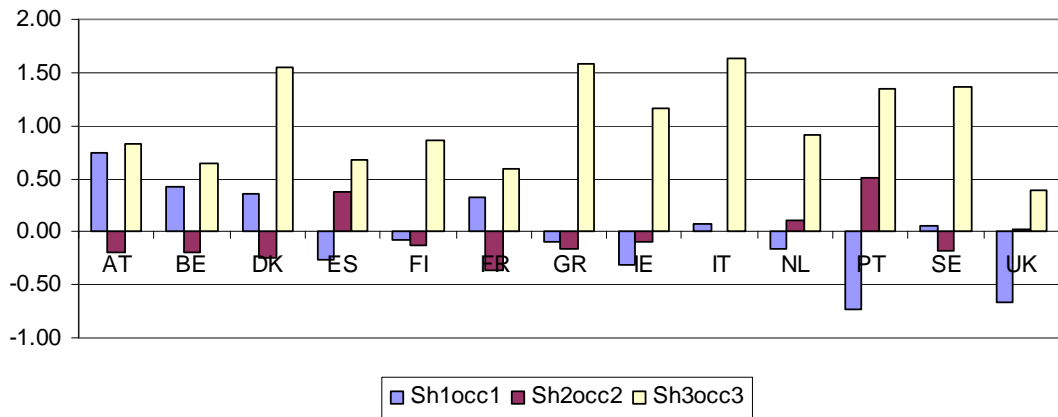
Graph 24

**Over qualification in service industries, 2005-07**



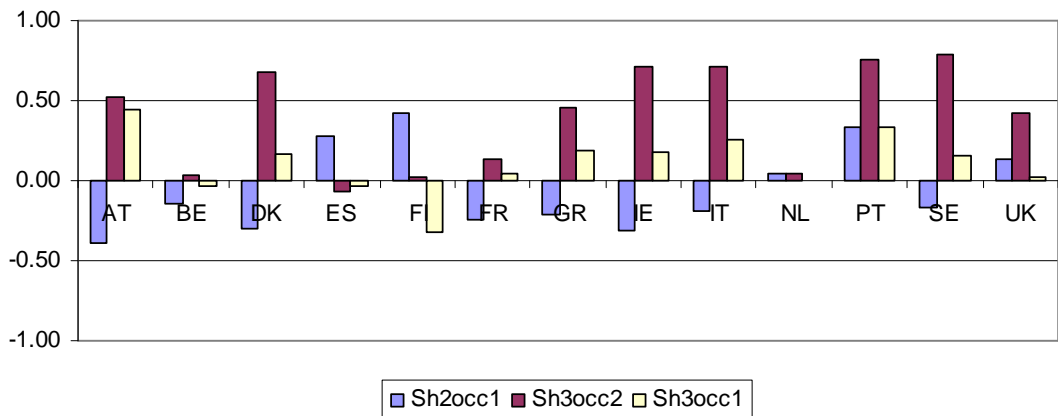
Graph 25

**Correct qualification in service industries, 2005-07**



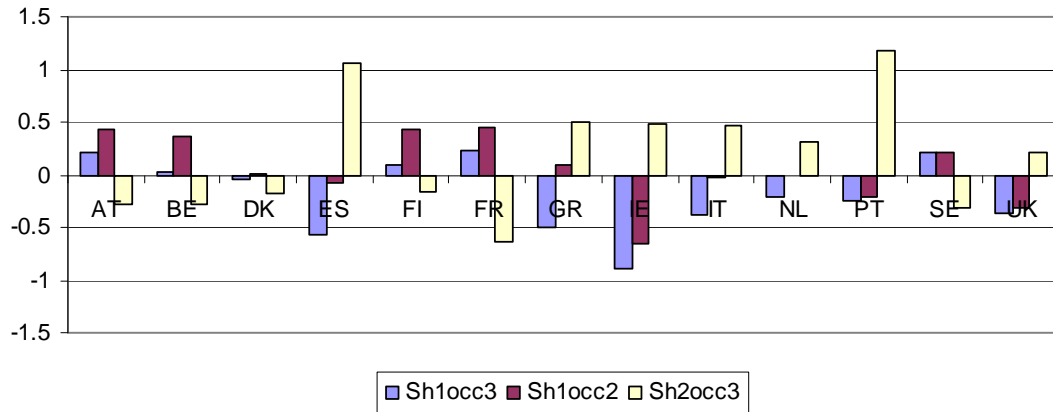
Graph 26

**Under qualification in service industries, 2005-07**



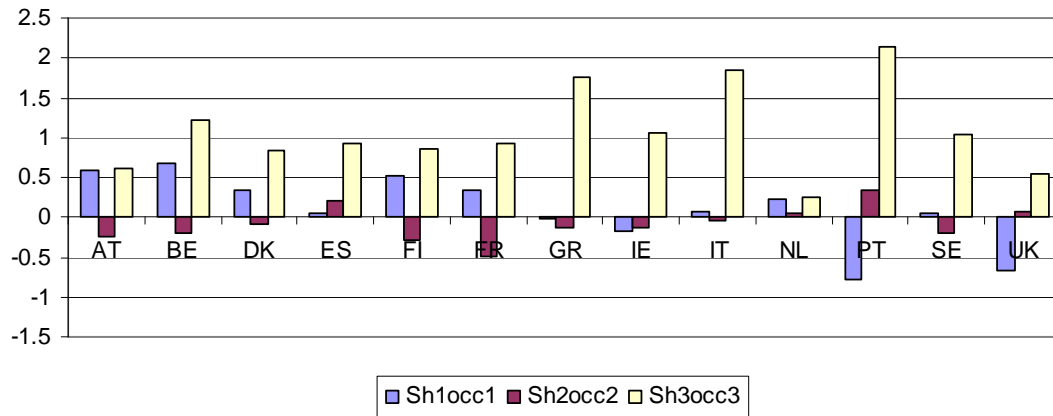
Graph 27

**Over qualification in high skill industries, 2005-07**



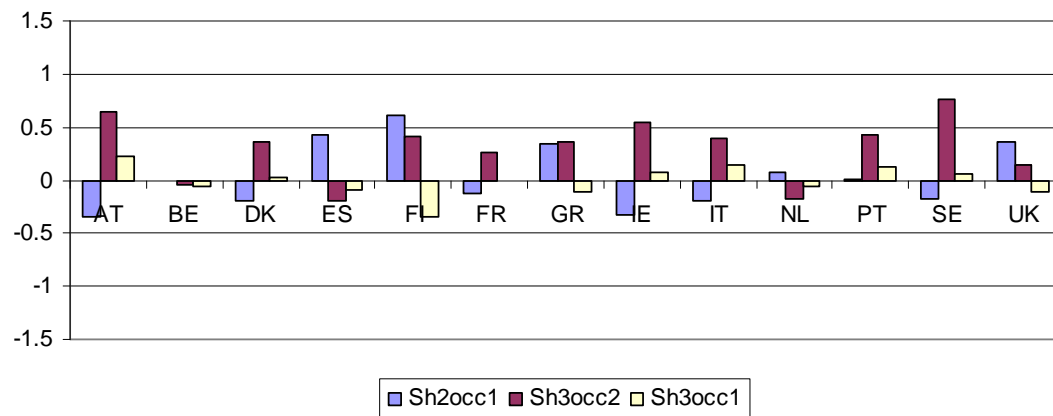
Graph 28

**Correct qualification in high skill industries, 2005-07**



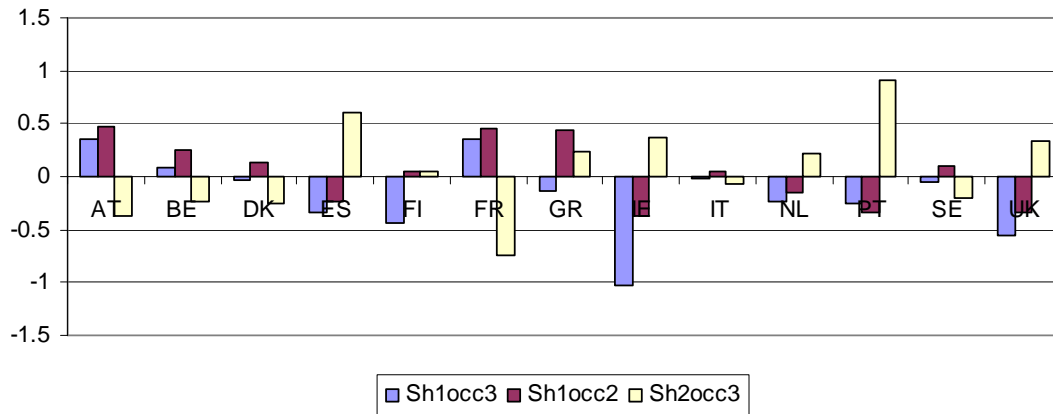
Graph 29

**Under qualification in high skill industries, 2005-07**



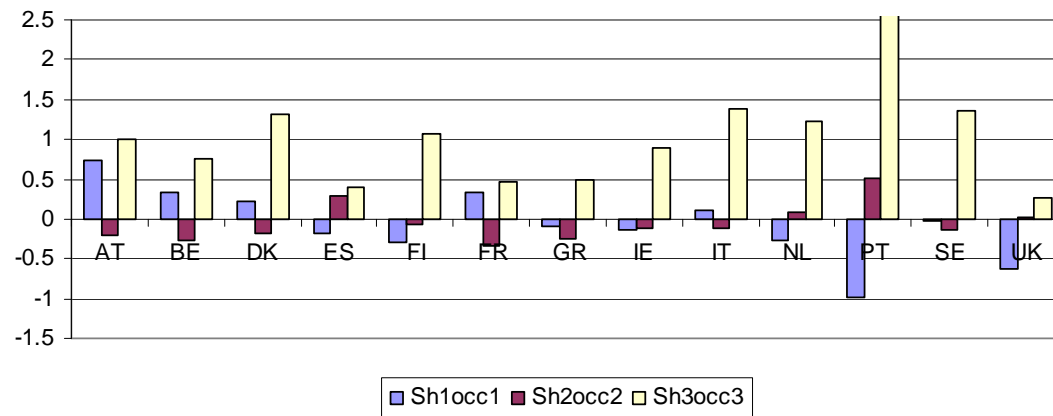
Graph 30

**Over qualification in medium skill industries, 2005-07**



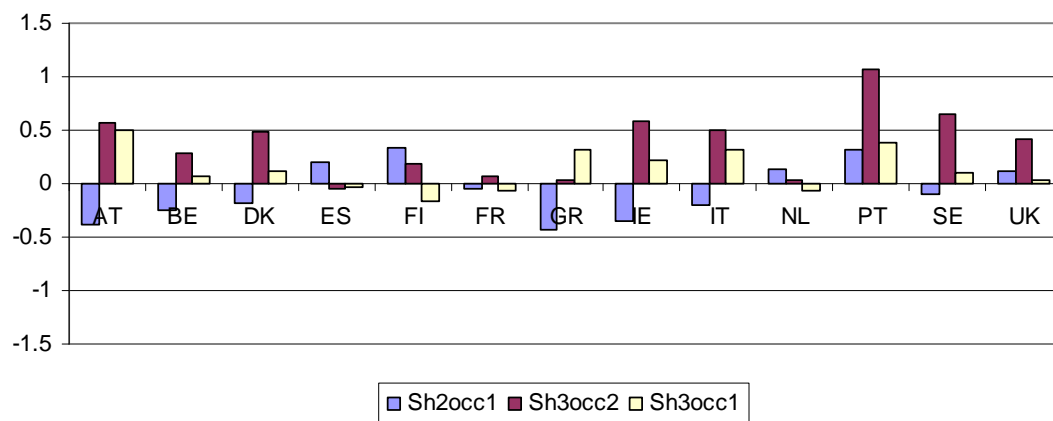
Graph 31

**Correct qualification in medium skill industries, 2005-07**



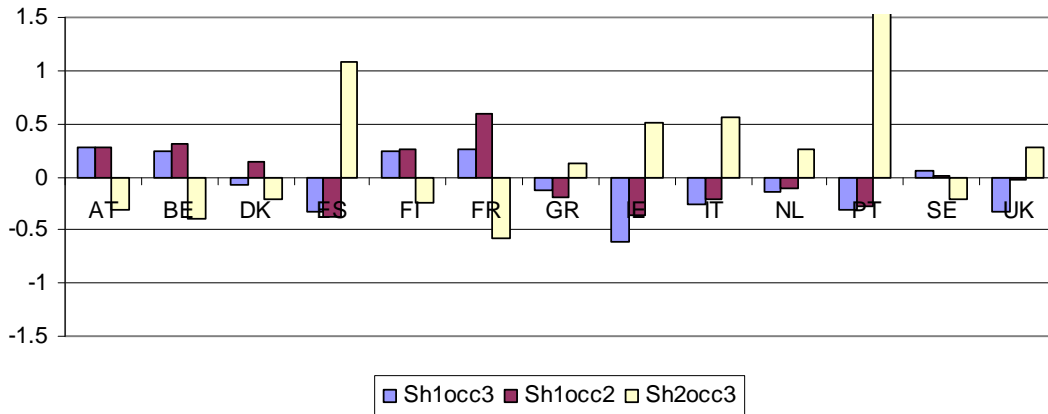
Graph 32

**Under qualification in medium skill industries, 2005-07**



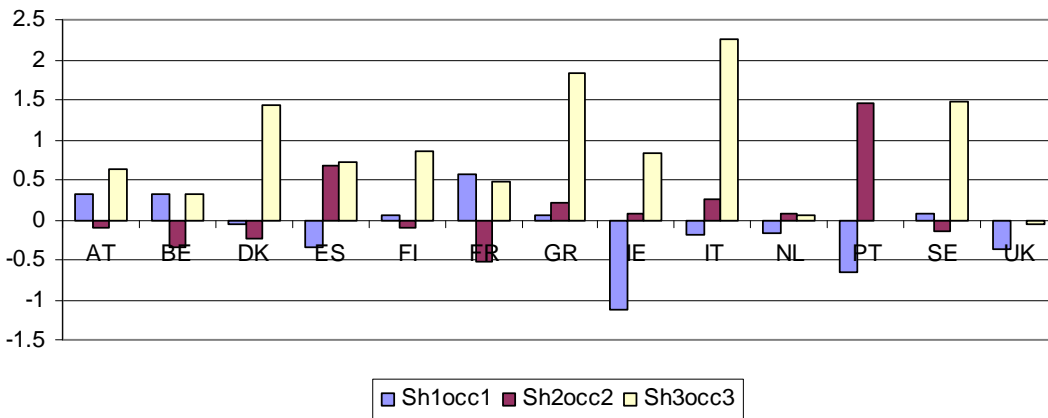
Graph 33

**Over qualification in low skill industries, 2005-07**



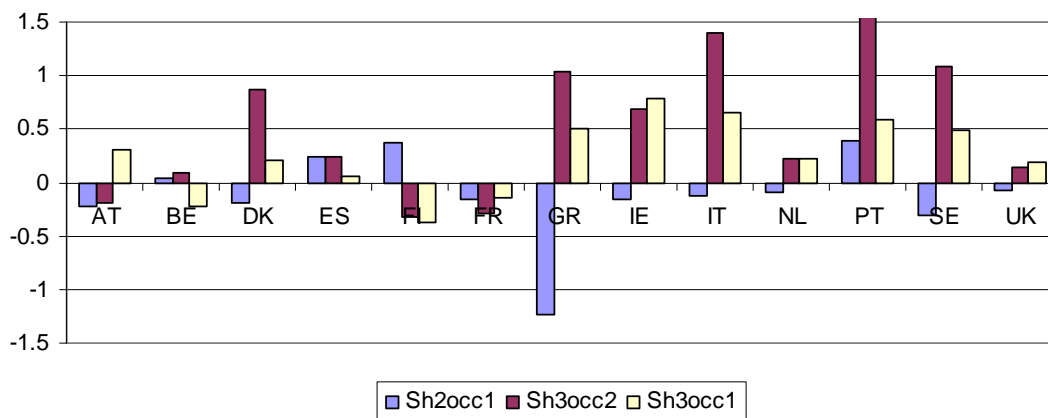
Graph 34

**Correct qualification in low skill industries, 2005-07**



Graph 35

**Under qualification in low skill industries, 2005-07**



## 2.5 Analysis of migrants allocation in high-, medium- and low- growth industries (in terms of total factor productivity, labour productivity and output growth)

This section is preparatory to the econometric analysis conducted in Part II of the report and studies the relationship between migrant workers and the growth in total factor productivity ( $\Delta$  TFP), labour productivity ( $\Delta$  LP), and value added ( $\Delta$  VA). The data come from the LFS dataset in combination with the EUKLEMS dataset (see [www.euklems.net](http://www.euklems.net); this dataset is used in Part 2 of this study and contains industry-level information on TFP, LP and VA) and the data sets used here ranges from 2000 to 2005. In this descriptive part of the study, industries were classified into three groupings according to their growth rates, averaged over the available 6 years. Thus, the first third was named *high growth industries*; the second *medium growth industries*; and the last *low growth industries*. Table 3 shows each third's industry cluster for the corresponding variable.

Table 3

### Industry groups according to growth rates (annual in %), averages 2000-2005

Industry	$\Delta$ TFP	Industry	$\Delta$ LP	Industry	$\Delta$ VA
<i>high growth industries</i>					
30t33	4.05	30t33	6.78	64	5.61
64	3.62	64	6.31	J	4.33
J	2.63	J	4.44	P	4.28
20	1.86	23	4.09	23	3.24
29	1.85	E	3.99	71t74	3.14
23	1.83	15t16	3.39	51	2.98
E	1.74	24	3.31	E	2.80
17t19	1.71	17t19	3.29	24	2.54
15t16	1.67	29	3.28	N	2.40
34t35	1.57	20	3.18	52	2.38
<i>medium growth industries</i>					
24	1.23	34t35	3.02	30t33	2.34
51	1.19	21t22	2.72	O	2.26
25	1.12	25	2.67	20	1.92
AtB	1.08	26	2.24	15t16	1.92
26	0.70	51	2.21	70	1.90
36t37	0.55	36t37	2.17	29	1.77
52	0.54	AtB	2.10	F	1.43
27t28	0.50	27t28	1.69	60t63	1.35
21t22	0.36	52	1.47	L	1.23
P	-0.01	C	1.46	34t35	1.07
<i>low growth industries</i>					
50	-0.29	P	0.95	50	1.07
F	-0.47	60t63	0.76	25	0.98
C	-0.69	71t74	0.73	M	0.95
L	-0.73	50	0.64	27t28	0.60
71t74	-0.84	O	0.54	H	0.52
60t63	-0.95	F	0.24	26	0.28
N	-1.01	L	0.19	C	0.26
M	-1.13	N	-0.30	21t22	0.02
O	-1.13	H	-0.57	AtB	-0.14
H	-1.16	M	-0.69	36t37	-0.69
70	-1.96	70	-0.92	17t19	-4.16

Note: See Annex Table A6 for a fuller description of these industry groupings.

Migrant shares by country were calculated for each industry group. Each of the following graphs depict the shares of migrant workers in total employed persons ( $shM$ ), the shares of highly educated migrants in total highly educated employed persons ( $shM3$ ), and finally the shares of highly educated migrants in total migrants ( $stM3$ ). Graphs 36a to 36c show the migrant shares in the TFP growth industry clusters; the graphs 37a to 37c show these shares in the LP growth industry groupings; and the VA growth industry groupings are depicted in the graphs 38a to 38c.

An alternative presentation of the allocation pattern is given in graphs 39 to 41. Here we look at the difference between the migrant shares calculated in the previous sets of graphs and total economy migrant shares, that is we calculate:

$$shM_j^i - shM^i, shM3_j^i - shM3^i, stM3_j^i - stM3^i,$$

where  $i$  denotes the country and  $j$  denotes the industry growth group (high growth, medium growth, low growth). The graphs 39 to 41 show the relative allocation patterns of migrants and of high skilled migrants across the different industry groupings: graphs 39a to 39c for the TFP growth groups, graphs 40a to 40c for the LP growth groups, and graphs 41a to 41c for the LP growth industry groups.

For many countries one can observe a bipolar structure in the migrant shares depicted in graphs 39 to 41. Austria, for example, has relatively low shares of migrants in the total labour force ( $shM$ ) in the high and low TFP growth industries compared to the medium TFP growth industries. The same is true for the share of high skilled migrants in total high skilled employed persons ( $shM3$ ) while a reversed structure appears for the share of high skilled migrants in total workers ( $stM3$ ). The latter would reflect that high skilled migrants find it easier than migrants in general to find jobs in high TFP growth industries and they can also be found over-proportionately in low TFP growth industries. The same pattern applies to the LP growth industries.

Across most countries we find a rather negative allocation pattern of migrants and especially of highly educated migrants relative to all high educated employed people ( $shM3$ ) with respect to high TFP and LP growth industries (Netherlands, Sweden seem to be exceptions). On the other hand, the allocation patterns are strongly positive with respect to high VA growth industries. Many more patterns can be discussed on the basis of these graphs, but we shall now proceed towards an econometric analysis of the relationship migrants' presence and productivity and output growth patterns.

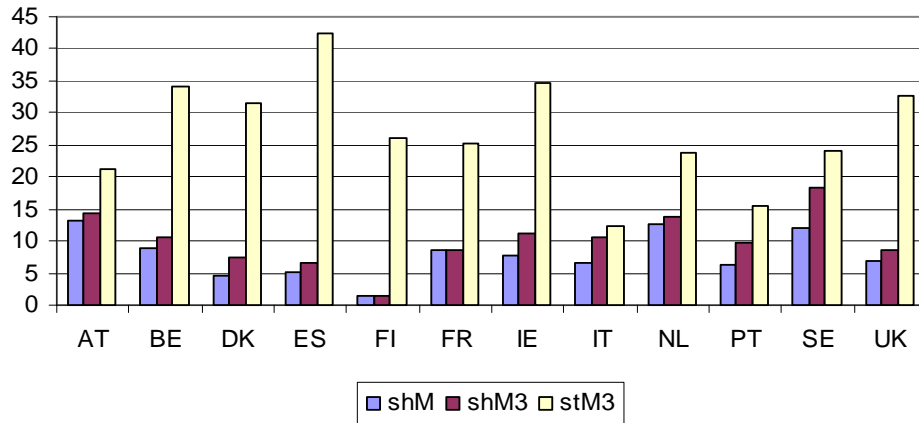


Graph 36

**Migrant shares (averages 2000-2005)**

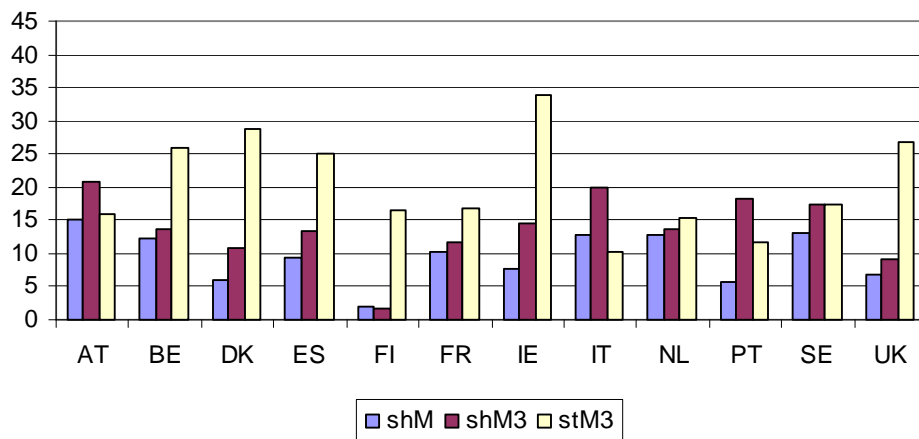
Graph 36a

**Migrant shares in high TFP growth industries**



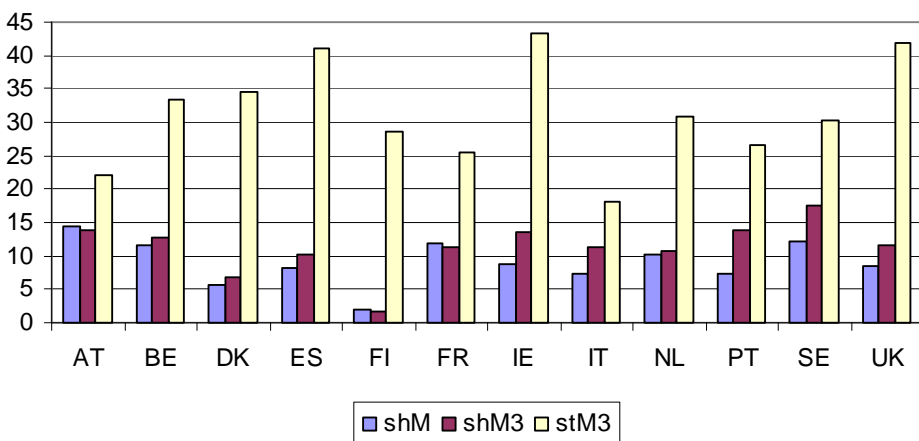
Graph 36b

**Migrant shares in medium TFP growth industries**



Graph 36c

**Migrant shares in low TFP growth industries**

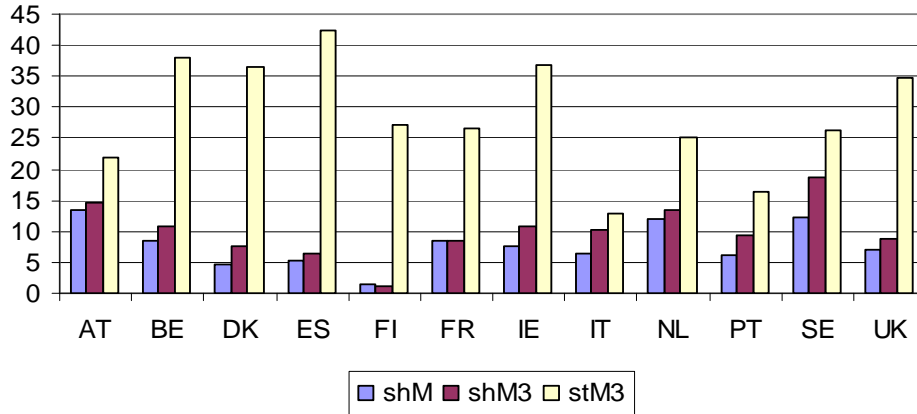


Graph 37

**Migrant shares (averages 2000-2005)**

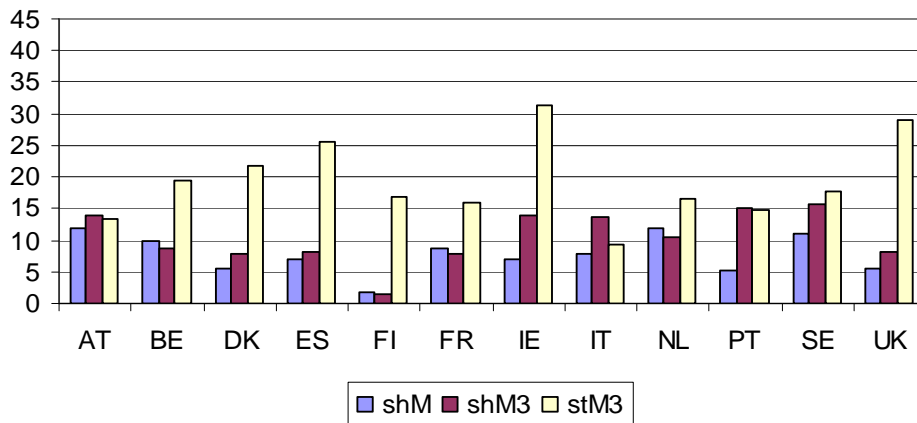
Graph 37a

**Migrant shares in high LP growth industries**



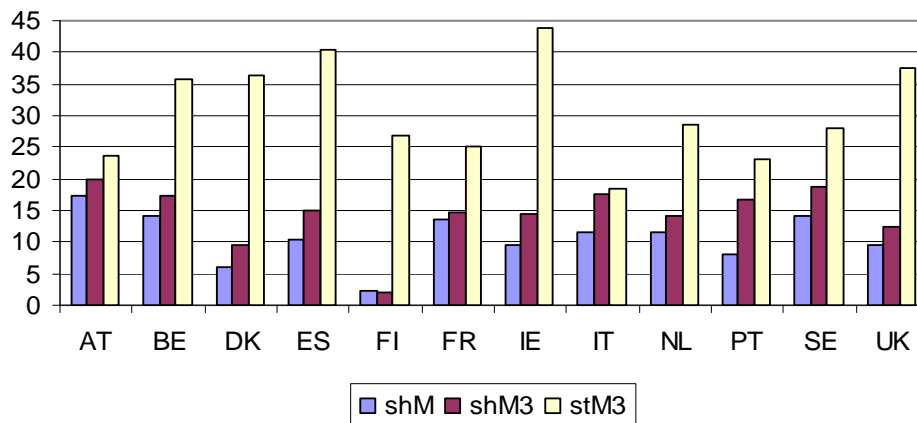
Graph 37b

**Migrant shares in medium LP growth industries**



Graph 37c

**Migrant shares in low LP growth industries**

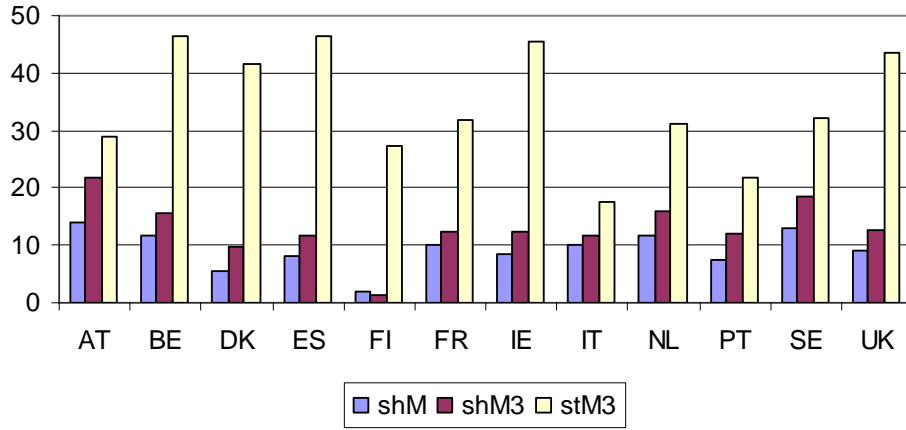


Graph 38

**Migrant shares (averages 2000-2005)**

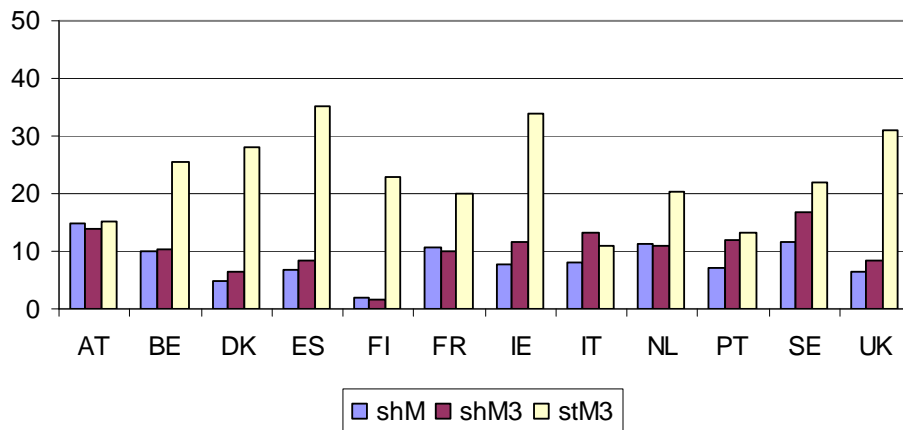
Graph 38a

**Migrant shares in high VA growth industries**



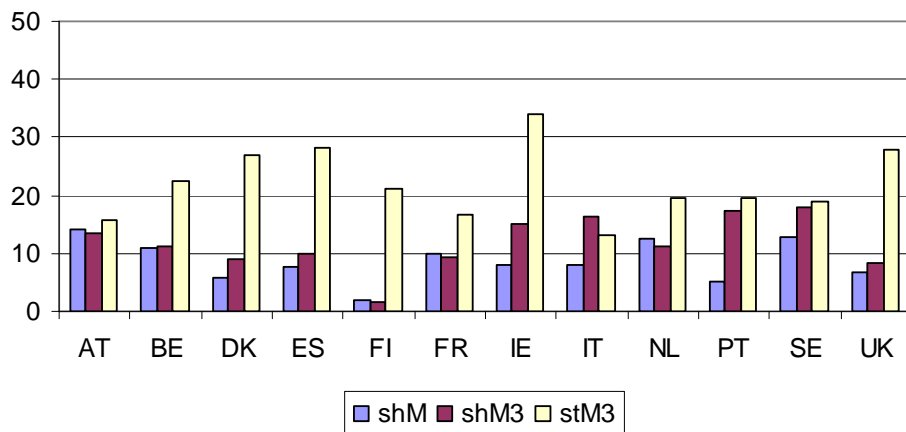
Graph 38b

**Migrant shares in medium VA growth industries**



Graph 38c

**Migrant shares in low VA growth industries**

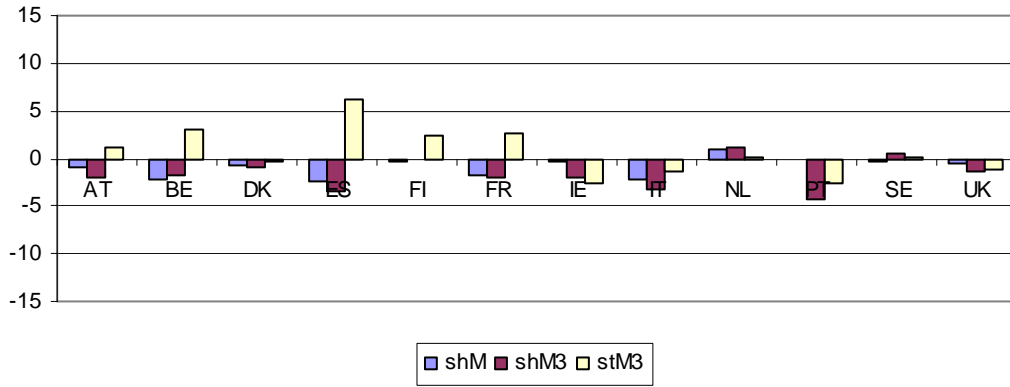


Graph 39

**Adjusted Migrant shares (averages 2000-2005)**

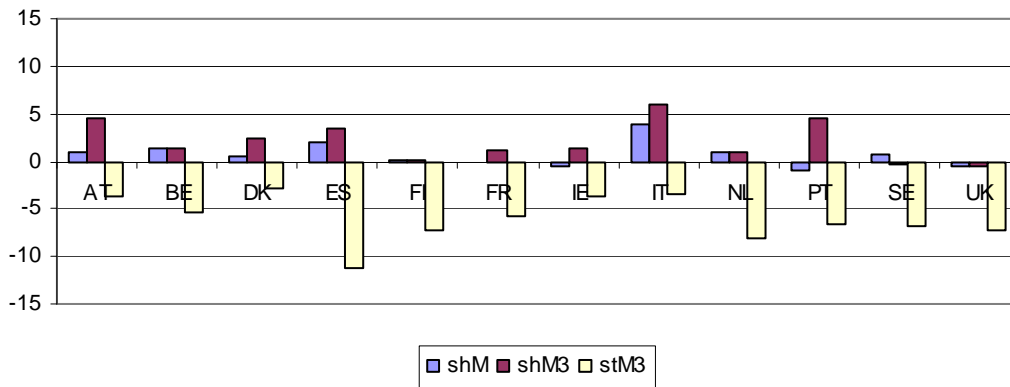
Graph 39a

**Migrant shares in high TFP growth industries**



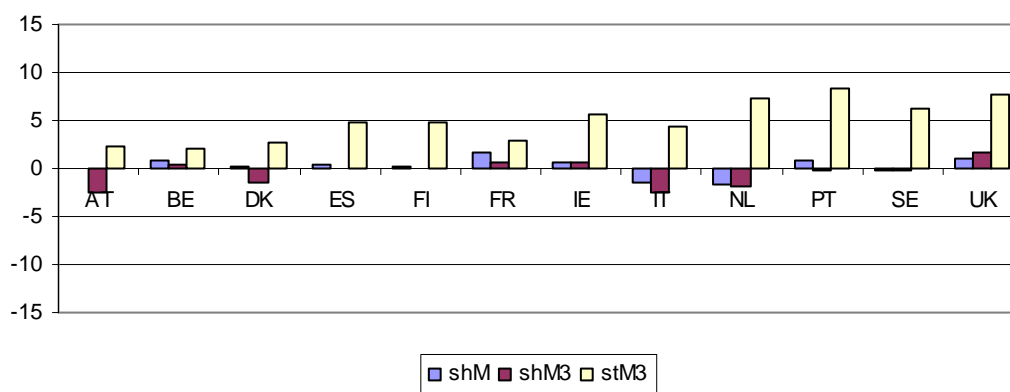
Graph 39b

**Migrant shares in medium TFP growth industries**



Graph 39c

**Migrant shares in low TFP growth industries**

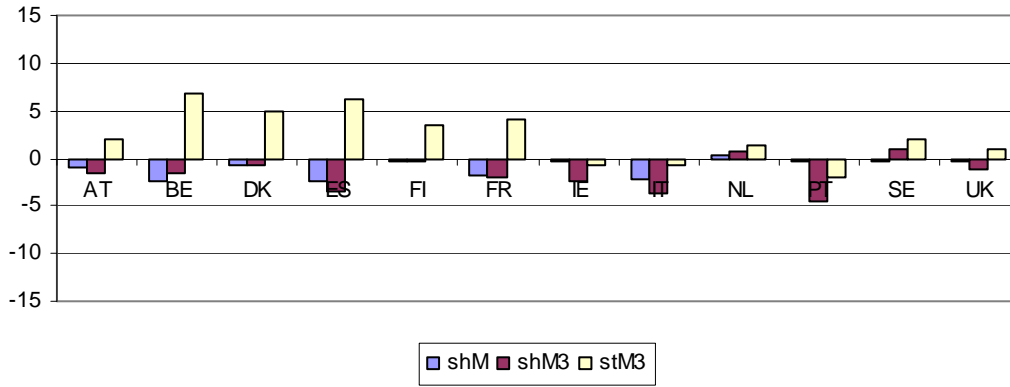


Graph 40

**Adjusted Migrant shares (averages 2000-2005)**

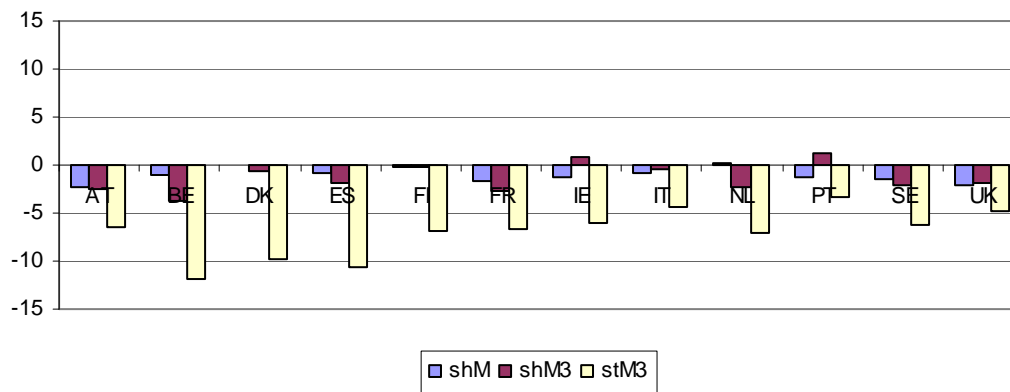
Graph 40a

**Migrant shares in high LP growth industries**



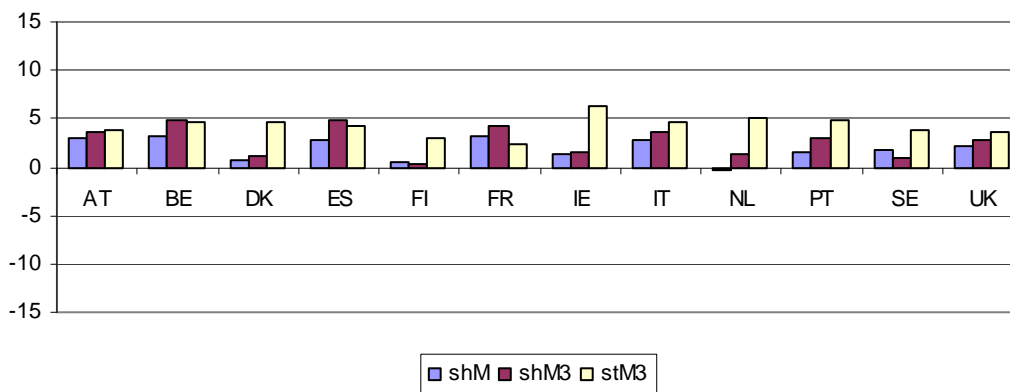
Graph 40b

**Migrant shares in medium LP growth industries**



Graph 40c

**Migrant shares in low LP growth industries**

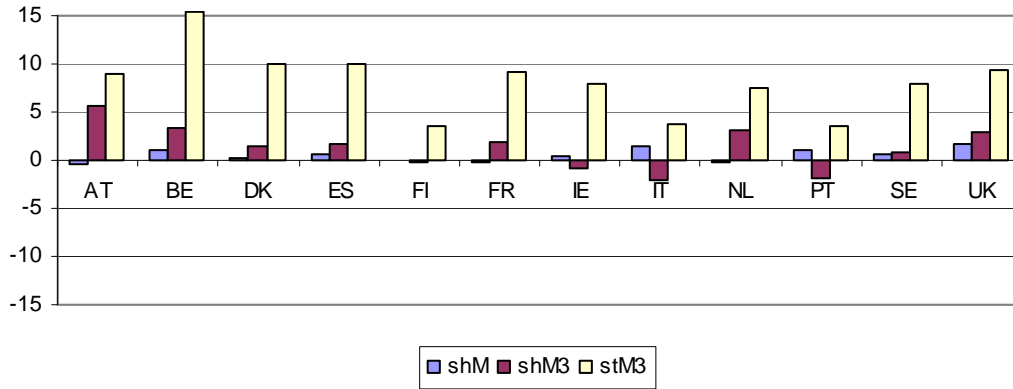


Graph 41

**Adjusted Migrant shares (averages 2000-2005)**

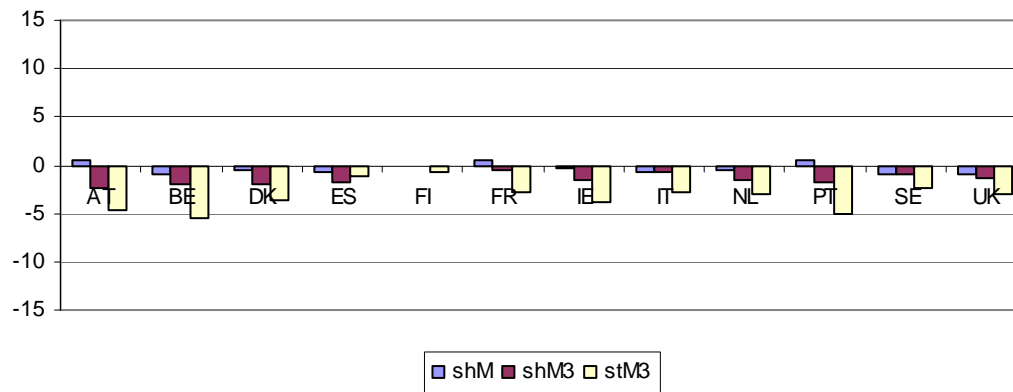
Graph 41a

**Migrant shares in high VA growth industries**



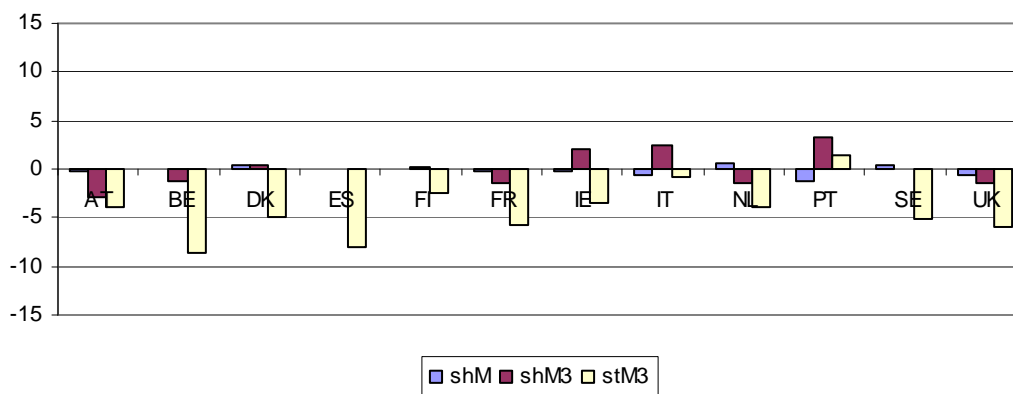
Graph 41b

**Migrant shares in medium VA growth industries**



Graph 41c

**Migrant shares in low VA growth industries**



## Appendix A

Table A.1

### List of NACE Rev. 1, 2 digits industries (EUROSTAT, 1996)

NACE	DESCRIPTION	Share of Industry's workers in total Workforce (%, 2005-07)	Absolute Values of Industries Workforce in Total Workforce (%, 2005-07) in 1000s
1	Agriculture, hunting and related service activities	3.7	4951.044
2	Forestry, logging and related service activities	0.2	220.6002
5	Fishing, fish farming and related service activities	0.1	163.3164
10	Mining of coal and lignite; extraction of peat	0.0	31.46129
	Extraction of crude petroleum and natural gas; service activities incidental to oil and gas extraction, excluding surveying		
11		0.1	112.7606
12	Mining of uranium and thorium ores	0.0	1.734797
13	Mining of metal ores	0.0	18.49986
14	Other mining and quarrying	0.1	174.2967
15	Manufacture of food products and beverages	2.1	2762.438
16	Manufacture of tobacco products	0.0	37.43523
17	Manufacture of textiles	0.5	733.4781
18	Manufacture of wearing apparel; dressing and dyeing of fur	0.5	656.9625
	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear		
19		0.2	314.9727
	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials		
20		0.5	740.5136
21	Manufacture of pulp, paper and paper products	0.3	463.5497
22	Publishing, printing and reproduction of recorded media	1.0	1397.87
	Manufacture of coke, refined petroleum products and nuclear fuel		
23		0.1	173.9078
24	Manufacture of chemicals and chemical products	1.0	1383.111
25	Manufacture of rubber and plastic products	0.7	960.7648
26	Manufacture of other non-metallic mineral products	0.7	998.9135
27	Manufacture of basic metals	0.6	766.6674
	Manufacture of fabricated metal products, except machinery and equipment		
28		1.8	2439.699
29	Manufacture of machinery and equipment n.e.c.	1.6	2132.207
30	Manufacture of office machinery and computers	0.1	189.3763
31	Manufacture of electrical machinery and apparatus n.e.c.	0.6	771.0156
	Manufacture of radio, television and communication equipment and apparatus		
32		0.4	500.6511
	Manufacture of medical, precision and optical instruments, watches and clocks		
33		0.5	629.5529
34	Manufacture of motor vehicles	0.9	1278.294
35	Manufacture of other transport equipment	0.6	743.7681
36	Manufacture of furniture; manufacturing n.e.c.	1.1	1416.303
37	Recycling	0.1	102.0657
40	Electricity, gas, steam and hot water supply	0.5	704.5107
41	Collection, purification and distribution of water	0.2	228.7815
45	Construction	8.5	11488.83
	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel		
50		2.1	2765.865
	Wholesale trade and commission trade, except of motor vehicles and motorcycles		
51		3.6	4903.188

Table A.1 continued

Table A.1 (continued)

52	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	9.0	12073.42
55	Hotels and restaurants	4.7	6367.225
60	Land transport; transport via pipelines	2.7	3575.98
61	Water transport	0.1	198.5202
62	Air transport	0.2	319.3228
63	Supporting and auxiliary transport activities; activities of travel agencies	1.4	1860.598
64	Post and telecommunications	1.7	2319.635
65	Financial intermediation, except insurance and pension funding	2.0	2721.733
66	Insurance and pension funding, except compulsory social security	0.6	777.436
67	Activities auxiliary to financial intermediation	0.6	816.352
70	Real estate activities	1.1	1440.066
71	Renting of machinery and equipment without operator and of personal and household goods	0.3	365.7172
72	Computer and related activities	1.5	1966.819
73	Research and development	0.4	486.945
74	Other business activities	7.3	9831.604
75	Public administration and defence; compulsory social security	7.3	9816.745
80	Education	7.3	9899.064
85	Health and social work	10.3	13937.13
90	Sewage and refuse disposal, sanitation and similar activities	0.5	625.8414
91	Activities of membership organizations n.e.c.	0.8	1087.624
92	Recreational, cultural and sporting activities	2.1	2794.829
93	Other service activities	1.4	1876.419
95	Activities of households as employers of domestic staff	1.5	2070.103
96	Undifferentiated goods producing activities of private households for own use	0.0	0.15506
97	Undifferentiated services producing activities of private households for own use	0.0	0.342215
99	Extra-territorial organizations and bodies	0.1	118.3847



### 3. Part II: Migrants and productivity and output growth – regional and sectoral impacts - econometric analysis

#### 3.1 Migrants and industry performance

##### 3.1.1 Introduction

In this part of the study we present descriptive econometric evidence on the relation of migrant variables and industry performance. For the latter we use change in total factor productivity, labour productivity and value added growth. Total factor productivity measures are taken from the EU KLEMS database<sup>3</sup> which provides total factor productivity measures at the disaggregated level for almost all countries for which also migrant variables are available (see Timmer et al., 2008, for details). In the growth accounting exercise the change in output (i.e. value added as we consider value added TFP) of a particular industry *i* is expressed as the weighted growth of inputs and total factor productivity (TFP), i.e.

$$\Delta \ln Y_{it} = \sum_k \bar{s}_{jkt} \Delta \ln X_{jkt} + \Delta \ln TFP_{jt}$$

where *i* denotes the sector, *t* is time, *Y* is value added,  $\bar{s}$  denotes two-period average shares and *k* denotes the factors of production (e.g. capital, labour); TFP is total factor productivity. Measures of labour inputs in the EU KLEMS database are based on detailed hours worked data by education, age and gender and capital stock is broken down into several asset types. The shares are constructed using information of factor prices. This equation is based on various assumptions (competitive factor markets, full input utilization and constant returns to scale). Under these strict neo-classical assumptions TFP growth should measure disembodied technical change. However as it is measured as a residual this term also includes a number of other effects like changes in returns to scale, mark-ups, measurement errors, and unmeasured inputs. (For technical details see Timmer et al., 2008, and Jorgenson et al., 2005). Total factor productivity growth is thus calculated taking into account different types of labour (by educational levels, age structures and gender differences). However, the calculations do not differentiate between domestic and foreign workers which could have an additional effect. The use of migrant labour on total factor productivity could be positive or negative: it could be positive e.g. when there is a 'gain from variety' i.e. migrants add certain skills which domestic workers do not possess (see Ottaviano and Peri, 2006a and 2006b), or they could contribute more work effort given the same level of skills, or they allow the use of a better mix of skills in case there are skill supply constraints, etc. The impact could, of course, also be negative, in case migrant workers' actual skills are less than those formally measured, or work attitudes are worse compared to domestic workers, or a more heterogeneous work force gives more cause to frictions and thus reduced work performance, etc. All these possible effects have not been taken into account when one constructed the measure of TFP in the EUKLEMS database

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<sup>3</sup> [www.euklems.net](http://www.euklems.net)

and this is the main rationale for undertaking the additional econometric exercises presented here. We shall also regress migrant variables on labour productivity growth following similar arguments as above, although here we are on shakier grounds as we are estimating a very partial model in this respect and the analysis could still be more refined.. Finally, we also use growth of value added as a dependent variable. A positive relationship could indicate on the one hand that faster growing industries have to rely on foreign workers (when labour markets are tight); on the other hand, it could also mean that foreign workers are mainly attracted by faster growing industries, which poses a kind of endogeneity problem in the regressions. We try to circumvent this by using lagged variables, etc. Though to tackle the problem properly a more complex econometric strategy would have to be followed which is however not possible given the data at hand. This is also the reason why we use the term 'descriptive regressions'.

The independent variables included are the share of migrants in total employed persons (shM), the share of high educated migrants in total high educated employed persons (where high education means tertiary level of education) and finally the structure of migrants, i.e. the share of high educated in total migrants. In Tables 4 to 6 we present these shares as averages over time (2000-2005).

### 3.1.2 Data and descriptive statistics

Table 4

#### Share of migrants by industry (averages 2000-2005, in %)

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
AtB	3.1	5.9	3.8	10.0	0.6	5.8	2.9	5.6	0.9	3.5	2.6
C	4.7	12.0	7.4	8.7	0.5	6.7	5.7	9.4	2.3	5.8	5.6
15t16	19.7	11.0	6.5	7.1	1.6	6.7	9.2	16.1	4.0	15.7	8.2
17t19	27.4	10.3	4.8	6.9	0.9	16.5	9.5	18.4	3.2	20.4	11.9
20	14.1	6.1	2.4	9.0	1.0	8.7	6.9	9.3	3.3	6.9	2.7
21t22	14.4	8.8	4.0	5.7	1.0	7.1	8.3	9.8	6.9	9.8	6.2
23	13.8	10.2	0.0	2.5	0.6	7.5	7.4	11.9	13.2	14.1	6.5
24	14.2	8.6	7.2	4.9	1.7	8.3	7.4	10.6	6.8	15.2	7.2
25	18.5	8.1	7.2	5.6	1.6	10.2	8.5	16.4	6.4	16.7	4.3
26	14.9	11.4	5.9	7.2	2.2	8.5	6.8	13.9	5.8	10.8	3.9
27t28	14.2	11.6	5.9	6.0	1.6	10.4	6.5	15.4	4.6	13.4	4.1
29	15.0	8.9	5.2	4.6	1.9	8.5	7.1	10.7	6.9	12.4	5.9
30t33	13.4	10.8	7.6	4.2	3.6	10.0	10.0	15.8	7.3	16.2	6.7
34t35	12.6	10.8	6.5	4.3	2.3	9.6	7.7	17.0	9.0	14.4	5.8
36t37	12.2	9.4	3.3	7.0	2.2	9.2	8.5	12.7	4.0	11.3	5.6
E	2.9	5.6	3.7	2.3	0.7	5.0	4.3	8.0	4.5	4.7	3.6
F	16.7	10.7	2.8	11.4	1.8	18.0	7.4	6.7	8.9	6.2	4.8
50	11.9	11.5	2.3	5.4	2.2	9.1	5.6	7.7	5.5	10.0	4.9
51	12.4	9.7	4.5	7.8	2.4	9.5	6.6	11.9	6.3	11.6	8.4
52	12.2	10.0	5.4	6.1	2.2	10.1	7.1	7.8	6.0	12.0	7.7
H	26.5	24.6	13.0	17.4	5.4	18.6	15.7	18.1	9.1	28.1	17.1
60t63	13.3	9.3	5.7	6.3	1.7	11.0	7.1	11.2	5.2	13.6	9.3
64	7.7	7.8	5.9	7.4	1.4	6.8	6.9	11.4	5.6	8.7	8.0
J	6.2	6.3	2.1	3.2	1.0	7.0	8.0	8.1	6.2	7.9	9.1
70	25.7	12.9	3.0	12.3	1.3	17.3	7.9	6.4	10.0	9.5	8.4
71t74	18.7	13.6	7.6	8.0	2.6	14.6	12.4	13.6	10.3	14.8	11.0
L	3.9	7.3	3.8	2.0	0.6	7.0	4.4	9.7	6.2	8.0	6.0
M	8.1	6.8	6.1	4.8	2.2	8.8	9.0	9.4	8.5	12.2	8.1
N	14.0	8.4	5.5	4.9	1.7	9.1	11.0	10.2	7.1	13.7	10.8
O	14.5	11.0	4.8	7.6	2.1	11.0	9.9	9.4	8.7	11.9	7.1
P	36.0	38.3	12.0	34.7	4.2	23.4	13.0	23.0	9.0	27.4	18.1

Table 5

**Share of high educated migrants in total high educated by industry (averages 2000-2005, in %)**

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
AtB	3.0	3.3	8.5	14.6	0.2	5.8	11.5	4.6	7.9	5.8	4.0
C	4.8	8.8	6.5	11.1	0.0	6.0	16.4	15.4	9.3	21.1	10.1
15t16	14.3	9.7	7.0	7.7	2.2	8.5	10.9	15.2	11.5	24.1	8.5
17t19	17.7	10.4	16.7	13.9	1.3	9.9	19.3	21.6	19.4	22.9	8.9
20	10.8	7.2	5.2	11.0	0.6	11.5	7.5	17.7	6.9	20.5	4.0
21t22	18.3	9.5	4.9	9.0	1.4	7.8	15.6	9.1	15.1	11.6	9.7
23	25.6	16.6	0.0	4.4	0.0	7.0	2.9	18.5	9.0	27.6	8.2
24	17.4	10.7	10.9	4.4	1.3	7.8	9.6	8.0	3.8	18.3	8.8
25	19.5	10.7	8.4	4.2	0.9	9.8	17.4	7.3	26.5	16.6	3.5
26	21.9	6.8	9.9	7.4	2.0	3.2	12.8	4.7	17.5	12.4	5.7
27t28	9.2	6.5	6.7	5.2	2.1	6.4	12.5	10.5	18.8	21.1	5.1
29	12.8	11.5	8.8	5.4	2.3	8.1	12.1	7.3	11.9	17.1	7.1
30t33	16.1	12.4	5.0	5.4	2.4	11.0	15.4	14.9	11.5	22.4	8.2
34t35	14.4	9.9	9.6	5.0	2.3	8.4	13.0	11.5	6.4	15.0	7.5
36t37	7.7	8.9	8.9	7.1	1.9	9.3	15.8	13.3	26.5	14.6	5.6
E	3.5	8.1	6.0	2.1	1.0	5.2	6.1	9.1	4.9	5.4	3.7
F	10.7	9.2	5.2	14.0	1.3	10.0	11.7	7.2	22.9	12.0	7.2
50	6.5	17.4	2.9	6.0	2.8	10.6	10.0	4.7	10.9	20.7	7.5
51	22.1	10.4	4.8	11.5	1.7	11.0	9.6	15.4	8.7	19.2	15.2
52	17.8	11.2	9.6	6.9	1.6	11.0	13.8	12.0	15.6	20.6	14.1
H	29.7	34.4	17.8	27.1	4.0	23.2	26.3	23.6	27.9	38.8	23.2
60t63	20.1	12.9	9.8	10.9	1.4	14.0	14.7	13.2	10.5	24.8	14.1
64	16.9	14.9	7.1	6.6	0.9	8.8	12.8	14.2	8.2	18.0	13.9
J	11.6	5.9	2.5	4.2	0.6	7.5	10.3	7.9	6.9	11.2	15.0
70	13.3	8.3	4.1	11.9	0.8	8.8	8.1	5.9	14.9	10.8	10.7
71t74	16.8	11.9	7.6	8.0	2.0	12.2	15.4	10.7	10.1	15.9	13.1
L	5.5	10.4	3.9	2.1	0.5	7.3	5.7	8.9	9.9	8.2	7.9
M	9.0	6.1	5.8	4.8	1.8	8.6	9.8	8.6	10.3	11.1	8.9
N	15.2	8.2	6.4	5.4	1.5	10.2	15.9	10.5	10.6	14.9	14.5
O	20.5	13.0	5.6	9.5	1.4	12.2	15.6	9.5	14.1	13.9	10.0

Table 6

**Share of high educated migrants in total migrants by industry (averages 2000-2005, in %)**

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
AtB	8.6	6.8	15.1	10.0	2.6	8.6	25.7	5.8	8.2	16.7	24.2
C	20.9	25.2	45.9	24.8	0.0	14.5	29.2	69.5	47.4	46.6	66.2
15t16	8.9	16.8	13.6	17.6	28.1	13.9	22.9	11.4	10.4	11.0	18.1
17t19	6.0	16.9	55.9	24.8	25.3	6.8	22.9	12.2	8.6	9.9	9.3
20	5.8	16.6	24.6	18.3	6.6	13.6	9.7	15.8	3.3	12.4	10.0
21t22	17.6	30.6	23.1	56.3	32.3	28.3	50.4	17.6	25.3	19.0	42.4
23	54.9	66.1		98.3	0.0	41.4	16.4	51.4	33.8	45.6	58.2
24	23.7	51.4	67.5	40.4	26.3	33.2	53.2	23.2	11.1	35.0	53.3
25	10.4	28.6	13.6	17.5	12.6	14.1	29.5	5.6	13.7	6.7	11.4
26	14.6	12.6	24.6	15.9	13.2	5.5	26.1	3.7	12.2	7.6	24.7
27t28	6.8	9.8	11.9	21.6	24.6	7.4	35.4	7.3	9.5	10.9	19.7
29	13.0	30.8	36.7	40.3	31.6	20.0	34.6	12.6	13.1	17.5	28.8
30t33	22.6	42.7	21.6	54.5	32.8	34.8	56.8	32.0	11.3	36.6	40.9
34t35	16.6	14.2	24.7	40.1	17.4	19.1	34.6	9.8	4.8	14.4	31.9
36t37	9.3	11.9	31.5	12.3	12.4	11.5	24.6	12.4	12.4	9.1	14.0
E	31.4	43.8	58.3	36.9	41.0	27.9	31.7	30.3	11.1	25.1	36.6
F	6.9	8.6	24.5	16.5	9.9	4.5	17.9	8.4	7.6	10.6	21.0
50	6.1	19.4	5.7	24.7	31.8	11.3	18.8	4.2	6.2	10.7	12.4
51	20.5	33.7	25.9	35.9	27.9	31.6	30.9	24.1	10.8	26.8	33.8
52	10.5	19.9	13.5	22.3	13.3	18.5	27.1	9.5	9.4	19.3	23.5
H	7.6	15.5	9.8	21.1	9.9	13.4	30.7	9.0	7.7	12.7	16.7
60t63	14.0	24.3	25.0	34.6	15.2	21.1	31.9	16.3	15.8	20.0	22.9
64	23.4	44.3	21.0	44.4	30.8	26.2	49.6	24.9	29.0	24.8	38.1
J	28.3	54.6	33.1	67.9	31.0	48.7	62.6	36.2	33.9	43.7	55.4
70	5.8	26.7	36.5	43.4	21.3	12.4	44.8	31.0	16.3	17.0	45.3
71t74	26.1	51.3	47.2	50.9	37.0	39.1	68.2	32.1	29.6	40.3	56.0
L	25.0	41.7	40.9	46.7	53.0	25.8	43.2	34.0	29.2	47.1	49.0
M	67.2	69.9	64.4	82.6	54.3	63.2	80.2	68.0	69.1	57.7	67.0
N	31.2	50.1	50.3	65.6	42.3	41.0	68.9	33.3	46.7	38.8	60.2
O	32.6	33.5	32.4	40.0	16.2	33.8	41.2	33.3	20.7	31.1	42.9
P	38.7	53.4	67.7	18.4	3.9	10.4	35.9	45.1	4.2	21.3	19.6

### 3.1.3 Descriptive regressions on total economy

We now present some regression results for the three independent and the set of dependent variables. As the shares of migrants in total persons employed (ShM) and the shares of high-educated migrants in total high-educated people (ShM3) correlate to some extent (the coefficient of correlation being about 0.6 for the pooled cross-section sample for instance) we also show results when including only one of them to circumvent problems with multicollinearity. We present both cross-section results for both the pooled sample and the individual countries and panel data results. For the former we calculated the average growth rates of total factor productivity, labour productivity and value added growth and regressed them on the initial values with respect to migration. A typical regression would read for example (in the cross-section case)

$$\Delta TFP_{ict} = \alpha + \beta_1 shM_{ict} + \beta_2 shM3_{ict} + \beta_3 stM3_{ict} + Dummies + \varepsilon_{ict}$$

where *Dummies* denote a set of country and/or industry dummies and  $\varepsilon$  denotes the usual error term. For the panel regression we use a similar equation with the proper error term specification.

#### 3.1.3.1 Cross-section results

In Table 7 we present the first set of regression results. Each column shows a different specification with respect to variables included. Columns 1-4 report the results when including all three migrant variables with different sets of dummies (for countries and industries); in columns 5-8 the variable shM3 (the share of high-educated migrants in total high-educated employed persons) is left out due to correlation with the share of high-educated migrants in total migrants (stM3); conversely in column 9-12 we skipped stM3. With respect to total factor productivity we find significantly positive effects for specifications 7 and 8 for both the share of migrants and the share of high-educated migrants in total migrants and also in specification 9. Using the specification with the best goodness of fit, the effect is however quite small. Turning to labour productivity as a dependent variable we find only a significant effect of the share of high-educated migrants in total high-educated employed persons in specification 1. With respect to growth of value added we find more often significant effects, in particular for the share of high-educated migrants in total migrants, though the effect becomes less significant when including dummy variables. It even disappears when including both industry and country dummies. Summarising, this set of results does not hint towards a negative effect of the impact of migrants on industry performance measures, though they are also not showing a robust positive significant effect of migration. In the Appendix Tables B.1-B.3 we present country specific results. There is no clear and consistent pattern across countries though the migration variables tend to be more often negative and for some countries significantly so. As in this case the variation is only across industries one can however not rule out endogeneity effects: If migrants are mostly occupied in low growth industries we would

expect to find a negative effect, though across countries the effect tends to be positive though not necessarily significant.

### *3.1.3.2 Panel results on pooled sample*

Next we turn to panel regression results. In Table 8 we show results when regressing the growth rate (of total factor productivity, labour productivity and value added) on the contemporaneous variables. Again we report different specifications with respect to inclusion of country, industry and year dummies and including shM and shM3 separately.

In this specification we find no significant effect of migrant variables on total factor productivity growth or labour productivity growth. Only when using value added growth as dependent variable we find a positive significant effect of the share of high-educated migrants in total migrants (stM3) in a number of specifications. This significance gets lost however when including industry dummies.

In Table 9 we present similar results however using migrant variables lagged by one year. In this case we find more often significantly negative effects of migrant variables on total factor productivity and labour productivity growth. For value added growth we again find a similar pattern as above; there is a significant positive effect which however vanishes when taking industry-specific effects into account.

Finally, we regress the dependent variables on changes in the migrant variables. These results are reported in Table 10. In this case we find strongly significant positive variables, in particular for the change in the share of migrants in total persons employed with less significant effects regarding the skill composition of migrants. For both these variables, i.e. the share of high-educated migrants in total high-educated persons employed and the share of high-educated migrants in total migrants, no robust significant effects appear. This is mostly the case for all three performance variables used in this study.

Table 7

## Results on pooled cross-section regressions

Dependent variable: Total factor productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	0.00	-0.09	0.07	0.00	0.04	-0.04	0.07 *	0.01				
	'(0.92)	'(0.12)	'(0.17)	'(0.95)	'(0.28)	'(0.43)	'(0.05)	'(0.91)				
shM3	0.04	0.04	0.01	0.00					0.04 *	0.02	0.03	0.00
	'(0.14)	'(0.11)	'(0.82)	'(0.94)					'(0.07)	'(0.38)	'(0.17)	'(0.91)
stM3	0.00	0.00	0.02	0.02	0.01	0.01	0.02 *	0.02 *	0.00	0.01	0.01	0.02
	'(0.69)	'(0.87)	'(0.14)	'(0.14)	'(0.36)	'(0.43)	'(0.07)	'(0.07)	'(0.65)	'(0.59)	'(0.29)	'(0.13)
F	1.33	3.19	2.50	3.02	0.91	3.22	2.58	3.10	1.99	3.24	2.51	3.10
R2	0.01	0.12	0.22	0.32	0.01	0.11	0.22	0.32	0.01	0.11	0.22	0.32
R2 adj.	0.00	0.08	0.13	0.21	0.00	0.08	0.14	0.22	0.01	0.08	0.13	0.22
N	320	320	320	320	320	320	320	320	320	320	320	320
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Dependent variable: Labour productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	-0.05	-0.09	0.01	0.01	0.01	-0.04	0.04	0.02				
	'(0.34)	'(0.10)	'(0.86)	'(0.94)	'(0.79)	'(0.36)	'(0.23)	'(0.65)				
shM3	0.05 *	0.04	0.03	0.01					0.03	0.01	0.03	0.02
	'(0.10)	'(0.15)	'(0.29)	'(0.61)					'(0.16)	'(0.61)	'(0.11)	'(0.50)
stM3	-0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.01
	'(0.62)	'(0.72)	'(0.85)	'(0.61)	'(0.91)	'(0.83)	'(0.45)	'(0.37)	'(0.83)	'(0.94)	'(0.90)	'(0.61)
F	0.96	2.17	3.57	3.60	0.04	2.16	3.65	3.69	0.98	2.11	3.69	3.70
R2	0.01	0.08	0.29	0.35	0.00	0.08	0.28	0.35	0.01	0.08	0.29	0.35
R2 adj.	0.00	0.04	0.21	0.26	-0.01	0.04	0.21	0.26	0.00	0.04	0.21	0.26
N	327	327	327	327	327	327	327	327	327	327	327	327
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Dependent variable: Value added growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	-0.02	0.00	0.00	0.04	0.00	0.00	0.00	0.02				
	'(0.65)	'(0.99)	'(0.96)	'(0.47)	'(0.97)	'(0.97)	'(0.96)	'(0.76)				
shM3	0.02	0.00	0.00	-0.02					0.01	0.00	0.00	-0.01
	'(0.54)	'(0.94)	'(0.98)	'(0.41)					'(0.68)	'(0.93)	'(0.99)	'(0.61)
stM3	0.03 ***	0.03 ***	0.02 *	0.02 *	0.03 ***	0.03 ***	0.02 *	0.02	0.03 ***	0.03 ***	0.02 *	0.02
	'(0.00)	'(0.00)	'(0.10)	'(0.09)	'(0.00)	'(0.00)	'(0.06)	'(0.14)	'(0.00)	'(0.00)	'(0.07)	'(0.13)
F	4.30	4.63	3.08	4.14	6.28	5.03	3.19	4.22	6.37	5.03	3.19	4.23
R2	0.04	0.16	0.26	0.39	0.04	0.16	0.26	0.38	0.04	0.16	0.26	0.39
R2 adj.	0.03	0.13	0.17	0.29	0.03	0.13	0.18	0.29	0.03	0.13	0.18	0.29
N	327	327	327	327	327	327	327	327	327	327	327	327
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Table 8

## Panel regression results

## Dependent variable: Total factor productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	0.04 '(0.33)	-0.02 '(0.76)	0.08 '(0.17)	0.05 '(0.34)	0.02 '(0.64)	-0.02 '(0.65)	0.07 '(0.14)	0.06 '(0.26)				
shM3	-0.02 '(0.32)	0.00 '(0.92)	0.00 '(0.93)	0.00 '(0.94)					-0.01 '(0.63)	-0.01 '(0.73)	0.02 '(0.54)	0.01 '(0.57)
stM3	-0.01 '(0.45)	-0.01 '(0.52)	0.00 '(0.88)	-0.01 '(0.70)	-0.01 '(0.30)	-0.01 '(0.48)	0.00 '(0.83)	-0.01 '(0.68)	-0.01 '(0.29)	-0.01 '(0.56)	-0.01 '(0.57)	-0.01 '(0.48)
F	0.81	3.79	3.10	3.06	0.73	4.11	3.18	3.13	0.73	4.10	3.13	3.11
R2	0.00	0.03	0.08	0.08	0.00	0.03	0.08	0.08	0.00	0.03	0.08	0.08
R2 adj.	0.00	0.02	0.05	0.06	0.00	0.02	0.05	0.06	0.00	0.02	0.05	0.06
N	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608	1608
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

## Dependent variable: Labour productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	0.01 '(0.90)	-0.02 '(0.73)	0.08 '(0.13)	0.07 '(0.19)	-0.01 '(0.65)	-0.03 '(0.30)	0.06 '(0.19)	0.05 '(0.25)				
shM3	-0.01 '(0.52)	-0.01 '(0.57)	-0.02 '(0.51)	-0.01 '(0.61)					-0.01 '(0.44)	-0.02 '(0.27)	0.00 '(0.90)	0.00 '(0.87)
stM3	0.00 '(0.90)	0.00 '(0.95)	0.01 '(0.56)	0.01 '(0.68)	0.00 '(0.76)	0.00 '(0.92)	0.00 '(0.77)	0.00 '(0.86)	0.00 '(0.87)	0.00 '(0.87)	0.00 '(0.87)	0.00 '(0.98)
F	0.22	2.33	3.61	3.40	0.14	2.48	3.68	3.47	0.33	2.51	3.64	3.44
R2	0.00	0.02	0.09	0.09	0.00	0.02	0.09	0.09	0.00	0.02	0.09	0.09
R2 adj.	0.00	0.01	0.06	0.06	0.00	0.01	0.06	0.07	0.00	0.01	0.06	0.06
N	1639	1639	1639	1639	1641	1641	1641	1641	1639	1639	1639	1639
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

## Dependent variable: Value added growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	0.02 '(0.55)	0.05 '(0.26)	0.05 '(0.34)	0.03 '(0.49)	0.04 '(0.17)	0.05 * '(0.09)	0.06 '(0.17)	0.05 '(0.23)				
shM3	0.01 '(0.58)	0.00 '(0.87)	0.01 '(0.64)	0.02 '(0.47)					0.02 '(0.18)	0.02 '(0.21)	0.02 '(0.27)	0.03 '(0.22)
stM3	0.02 *** '(0.00)	0.02 ** '(0.01)	-0.01 '(0.68)	-0.01 '(0.57)	0.02 *** '(0.00)	0.02 *** '(0.01)	0.00 '(0.81)	0.00 '(0.78)	0.02 *** '(0.01)	0.02 ** '(0.02)	-0.01 '(0.47)	-0.01 '(0.42)
F	3.59	5.11	4.21	4.26	5.16	5.56	4.33	4.36	5.20	5.43	4.29	4.35
R2	0.01	0.04	0.10	0.11	0.01	0.04	0.10	0.11	0.01	0.04	0.10	0.11
R2 adj.	0.01	0.03	0.08	0.09	0.01	0.03	0.08	0.09	0.01	0.03	0.08	0.09
N	1639	1639	1639	1639	1641	1641	1641	1641	1639	1639	1639	1639
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Table 9

## Panel regression results using lagged dependent variables

## Dependent variable: Total factor productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
L.shM	-0.03 '(0.44)	-0.14 *** '(0.00)	-0.09 '(0.11)	-0.11 ** '(0.05)	-0.01 '(0.84)	-0.09 ** '(0.03)	-0.05 '(0.28)	-0.07 '(0.14)				
L.shM3	0.02 '(0.31)	0.04 * '(0.05)	0.04 '(0.16)	0.04 '(0.14)					0.01 '(0.49)	0.01 '(0.70)	0.02 '(0.45)	0.02 '(0.51)
L.stM3	0.00 '(0.79)	0.00 '(0.66)	0.00 '(0.80)	0.00 '(0.95)	0.00 '(0.99)	0.00 '(0.87)	0.01 '(0.28)	0.01 '(0.44)	0.00 '(0.95)	0.00 '(0.79)	0.01 '(0.49)	0.01 '(0.62)
F	0.36	4.22	3.15	3.25	0.02	4.25	3.17	3.27	0.24	3.86	3.16	3.23
R2	0.00	0.03	0.08	0.09	0.00	0.03	0.08	0.09	0.00	0.03	0.08	0.09
R2 adj.	0.00	0.03	0.06	0.06	0.00	0.02	0.05	0.06	0.00	0.02	0.05	0.06
N	1598	1598	1598	1598	1598	1598	1598	1598	1598	1598	1598	1598
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

## Dependent variable: Labour productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
L.shM	-0.07 * '(0.08)	-0.14 *** '(0.00)	-0.09 '(0.10)	-0.10 * '(0.06)	-0.04 '(0.17)	-0.09 *** '(0.01)	-0.06 '(0.21)	-0.07 '(0.13)				
L.shM3	0.02 '(0.26)	0.03 '(0.15)	0.03 '(0.28)	0.03 '(0.27)					0.00 '(0.93)	-0.01 '(0.52)	0.01 '(0.79)	0.00 '(0.86)
L.stM3	0.00 '(0.61)	-0.01 '(0.60)	0.00 '(0.85)	-0.01 '(0.70)	0.00 '(0.85)	0.00 '(0.95)	0.00 '(0.71)	0.00 '(0.87)	0.00 '(0.96)	0.00 '(0.84)	0.00 '(0.79)	0.00 '(0.89)
F	1.06	3.24	3.80	3.69	0.96	3.32	3.87	3.75	0.01	2.78	3.83	3.69
R2	0.00	0.03	0.09	0.10	0.00	0.02	0.09	0.10	0.00	0.02	0.09	0.10
R2 adj.	0.00	0.02	0.07	0.07	0.00	0.02	0.07	0.07	0.00	0.01	0.07	0.07
N	1629	1629	1629	1629	1631	1631	1631	1631	1629	1629	1629	1629
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

## Dependent variable: Value added growth

	1	2	3	4	5	6	7	8	9	10	11	12
L.shM	-0.02 '(0.56)	-0.03 '(0.54)	-0.04 '(0.42)	-0.05 '(0.30)	0.01 '(0.71)	0.00 '(0.97)	-0.02 '(0.70)	-0.03 '(0.56)				
L.shM3	0.02 '(0.23)	0.02 '(0.34)	0.02 '(0.38)	0.03 '(0.29)					0.02 '(0.27)	0.01 '(0.47)	0.01 '(0.58)	0.01 '(0.54)
L.stM3	0.03 *** '(0.00)	0.03 *** '(0.00)	0.01 '(0.54)	0.00 '(0.73)	0.03 *** '(0.00)	0.03 *** '(0.00)	0.01 '(0.25)	0.01 '(0.36)	0.03 *** '(0.00)	0.03 *** '(0.00)	0.01 '(0.39)	0.01 '(0.51)
F	5.75	6.28	4.50	4.63	7.75	6.79	4.62	4.74	8.45	6.78	4.59	4.71
R2	0.01	0.05	0.11	0.12	0.01	0.05	0.11	0.12	0.01	0.05	0.11	0.12
R2 adj.	0.01	0.04	0.09	0.10	0.01	0.04	0.09	0.10	0.01	0.04	0.09	0.10
N	1629	1629	1629	1629	1631	1631	1631	1631	1629	1629	1629	1629
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.



Table 10

## Panel regression results using first differenced migrant variables

## Dependent variable: Total factor productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
D.shM	0.23 *** '(0.00)	0.23 *** '(0.00)	0.24 *** '(0.00)	0.24 *** '(0.00)	0.17 *** '(0.00)	0.17 *** '(0.00)	0.19 *** '(0.00)	0.19 *** '(0.00)				
D.shM3	-0.04 * '(0.05)	-0.04 ** '(0.05)	-0.04 * '(0.06)	-0.04 * '(0.08)					-0.01 '(0.60)	-0.01 '(0.60)	-0.01 '(0.76)	-0.01 '(0.79)
D.stM3	0.00 '(0.87)	0.00 '(0.88)	0.00 '(0.79)	0.00 '(0.78)	-0.01 '(0.17)	-0.01 '(0.17)	-0.01 '(0.14)	-0.01 '(0.16)	-0.01 '(0.21)	-0.01 '(0.21)	-0.02 '(0.15)	-0.01 '(0.16)
F	4.92	4.75	3.53	3.53	5.46	4.81	3.52	3.54	1.53	4.10	3.25	3.30
R2	0.01	0.04	0.09	0.10	0.01	0.04	0.09	0.10	0.00	0.03	0.08	0.09
R2 adj.	0.01	0.03	0.06	0.07	0.01	0.03	0.06	0.07	0.00	0.02	0.06	0.06
N	1584	1584	1584	1584	1584	1584	1584	1584	1584	1584	1584	1584
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

## Dependent variable: Labour productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
D.shM	0.21 *** '(0.00)	0.22 *** '(0.00)	0.23 *** '(0.00)	0.23 *** '(0.00)	0.15 *** '(0.00)	0.15 *** '(0.00)	0.17 *** '(0.00)	0.17 *** '(0.00)				
D.shM3	-0.04 * '(0.08)	-0.04 * '(0.05)	-0.04 * '(0.07)	-0.04 * '(0.09)					0.00 '(0.82)	-0.01 '(0.73)	0.00 '(0.96)	0.00 '(0.99)
D.stM3	0.00 '(0.77)	0.00 '(0.77)	0.00 '(0.87)	0.00 '(0.89)	-0.01 '(0.41)	-0.01 '(0.36)	-0.01 '(0.31)	-0.01 '(0.33)	-0.01 '(0.45)	-0.01 '(0.43)	-0.01 '(0.31)	-0.01 '(0.31)
F	4.38	3.47	4.18	3.98	4.55	3.28	4.16	3.97	0.47	2.65	3.88	3.71
R2	0.01	0.03	0.10	0.11	0.01	0.02	0.10	0.10	0.00	0.02	0.09	0.10
R2 adj.	0.01	0.02	0.08	0.08	0.00	0.02	0.08	0.08	0.00	0.01	0.07	0.07
N	1612	1612	1612	1612	1616	1616	1616	1616	1612	1612	1612	1612
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

## Dependent variable: Value added growth

	1	2	3	4	5	6	7	8	9	10	11	12
D.shM	0.17 *** '(0.00)	0.15 ** '(0.01)	0.14 ** '(0.01)	0.13 ** '(0.02)	0.14 *** '(0.00)	0.11 ** '(0.03)	0.10 ** '(0.03)	0.10 ** '(0.04)				
D.shM3	-0.03 '(0.22)	-0.03 '(0.18)	-0.02 '(0.22)	-0.02 '(0.27)					0.00 '(0.91)	-0.01 '(0.80)	0.00 '(0.90)	0.00 '(0.91)
D.stM3	0.00 '(0.68)	-0.01 '(0.62)	-0.01 '(0.42)	-0.01 '(0.42)	-0.01 '(0.19)	-0.01 '(0.14)	-0.02 * '(0.08)	-0.01 '(0.10)	-0.01 '(0.19)	-0.01 '(0.20)	-0.02 '(0.11)	-0.02 '(0.13)
F	3.55	5.40	4.62	4.73	5.01	5.86	4.75	4.87	1.00	5.31	4.57	4.70
R2	0.01	0.04	0.11	0.12	0.01	0.04	0.11	0.13	0.00	0.04	0.11	0.12
R2 adj.	0.01	0.03	0.09	0.10	0.01	0.04	0.09	0.10	0.00	0.03	0.09	0.10
N	1612	1612	1612	1612	1616	1616	1616	1616	1612	1612	1612	1612
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

### 3.1.3.3 Country-specific panel results

In this section we report country-specific results as one might suspect that the marginal effects of migrant variables differ across countries depending on migration policies and other conditions. One should however be aware that these results might be biased due to reversed causality and endogeneity which can only be insufficiently taken into account by using lagged variables. Table 11 presents the country-specific results when including the migrant variables contemporaneously.

Table 11

#### Country-specific panel regressions

##### Dependent variable: Total factor productivity growth

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
shM	-0.22 '(0.33)	-0.21 '(0.31)	0.44 '(0.18)	-0.16 '(0.48)	1.55 * '(0.09)	0.04 '(0.93)	0.22 '(0.76)	0.47 ** '(0.04)	-0.02 '(0.90)	1.23 *** '(0.01)	0.79 ** '(0.02)
shM3	0.37 *** '(0.00)	0.15 '(0.26)	-0.13 '(0.41)	-0.04 '(0.83)	-0.91 ** '(0.04)	-0.03 '(0.90)	-0.09 '(0.86)	-0.07 '(0.47)	-0.03 '(0.27)	-0.21 '(0.10)	0.04 '(0.88)
stM3	-0.18 ** '(0.01)	-0.03 '(0.60)	0.03 '(0.42)	-0.04 '(0.47)	0.09 ** '(0.04)	0.01 '(0.95)	0.31 '(0.15)	0.11 ** '(0.03)	-0.05 '(0.13)	-0.01 '(0.92)	-0.01 '(0.89)
Constant	0.09 '(0.12)	0.01 '(0.87)	0.00 '(0.96)	0.02 '(0.71)	0.54 *** '(0.00)	0.01 '(0.89)	-0.28 '(0.14)	-0.10 ** '(0.03)	0.03 '(0.46)	-0.12 '(0.17)	-0.09 * '(0.09)
F	1.43	0.83	0.66	1.22	4.42	0.73	0.74	2.37	1.35	3.69	2.28
R2	0.28	0.19	0.16	0.25	0.57	0.17	0.17	0.39	0.27	0.58	0.38
R2 adj.	0.09	-0.04	-0.08	0.04	0.44	-0.06	-0.06	0.23	0.07	0.42	0.22
N	154	149	137	149	145	155	149	150	150	120	150

##### Dependent variable: Labour productivity growth

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
shM	-0.38 '(0.13)	-0.08 '(0.63)	0.29 '(0.28)	-0.04 '(0.83)	1.32 '(0.14)	0.11 '(0.83)	0.18 '(0.81)	0.35 * '(0.08)	-0.13 '(0.53)	0.59 ** '(0.03)	0.58 '(0.11)
shM3	0.38 *** '(0.00)	0.07 '(0.53)	-0.12 '(0.26)	-0.10 '(0.57)	-0.72 * '(0.09)	-0.01 '(0.98)	-0.06 '(0.90)	-0.04 '(0.58)	-0.05 '(0.13)	-0.06 '(0.55)	0.15 '(0.60)
stM3	-0.15 * '(0.05)	-0.02 '(0.72)	0.01 '(0.71)	0.04 '(0.50)	0.08 ** '(0.04)	0.01 '(0.89)	0.39 * '(0.09)	0.07 '(0.14)	-0.03 '(0.39)	0.00 '(0.98)	-0.03 '(0.66)
Constant	0.09 '(0.16)	0.04 '(0.33)	0.01 '(0.78)	-0.05 '(0.40)	0.55 *** '(0.00)	0.01 '(0.74)	-0.34 * '(0.09)	-0.05 '(0.30)	0.03 '(0.34)	-0.07 '(0.23)	0.00 '(0.96)
F	1.39	0.99	0.84	1.49	4.97	0.61	0.81	1.89	2.79	3.96	2.01
R2	0.28	0.21	0.20	0.29	0.60	0.14	0.18	0.34	0.43	0.60	0.35
R2 adj.	0.08	0.00	-0.04	0.10	0.48	-0.09	-0.04	0.16	0.28	0.45	0.18
N	154	154	141	154	145	155	154	154	150	123	155

##### Dependent variable: Value added growth

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
shM	-0.30 '(0.21)	-0.21 '(0.21)	-0.50 * '(0.05)	-0.01 '(0.94)	1.47 '(0.19)	0.15 '(0.73)	0.02 '(0.98)	0.38 * '(0.05)	-0.11 '(0.53)	0.78 ** '(0.01)	0.10 '(0.70)
shM3	0.41 *** '(0.00)	0.09 '(0.45)	0.33 *** '(0.00)	-0.13 '(0.39)	-0.37 '(0.48)	-0.09 '(0.62)	0.44 '(0.36)	-0.05 '(0.48)	-0.03 '(0.29)	0.00 '(0.99)	0.15 '(0.43)
stM3	-0.27 *** '(0.00)	-0.03 '(0.49)	-0.04 '(0.19)	-0.01 '(0.76)	0.04 '(0.41)	0.03 '(0.70)	0.15 '(0.47)	0.08 * '(0.06)	0.00 '(0.94)	-0.08 '(0.30)	0.01 '(0.84)
Constant	0.17 *** '(0.00)	0.04 '(0.39)	0.04 '(0.40)	0.02 '(0.73)	0.50 *** '(0.00)	-0.01 '(0.77)	-0.15 '(0.41)	-0.08 * '(0.07)	0.01 '(0.69)	-0.13 ** '(0.04)	-0.01 '(0.75)
F	1.59	1.16	2.00	2.18	2.98	0.90	0.69	2.00	1.67	3.12	3.83
R2	0.30	0.24	0.37	0.38	0.47	0.20	0.16	0.36	0.31	0.54	0.51
R2 adj.	0.11	0.03	0.19	0.20	0.31	-0.02	-0.07	0.18	0.13	0.36	0.38
N	154	154	141	154	145	155	154	154	150	123	155

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

For total factor productivity growth we find significantly positive results for the migrant share for Finland, Netherlands, Sweden and UK. The share of high-educated migrants in total high educated persons employed is significantly positive in Austria, but significantly negative in the case of Finland. The share of high-educated migrants in total migrants is positive and significant in Finland and Sweden, however negatively significant in the case

of Austria. Regarding labour productivity growth we find a similar picture: There are significantly positive variables for Netherlands and Sweden for shM; shM3 is positively significant for Austria (and negative for Finland, though on a 10 % level only), whereas stM3 is negative for Austria (at the 10 % level) and significantly positive for Finland and Ireland. With respect to value added growth the share of migrants is significantly positive for Netherlands and Sweden, but negative for Denmark (at the 10 % level). The share of high-educated migrants in total high-educated is significant and positive for Austria and Denmark. The share of high-educated migrants in total migrants is however negative for Austria and slightly positive for the Netherlands. When additionally including year dummies the results are similar. When including neither industry nor year dummies the results are more mixed, however estimates are unreliable. In general the goodness of fit is rather low in most countries and in some cases the hypothesis of joint significance of all variables (the F-test) cannot be rejected.

Table 12

### Country-specific panel regressions including lagged variables

Dependent variable: Total factor productivity growth											
	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
L.shM	0.31 '(0.10)	0.19 '(0.29)	-0.05 '(0.84)	-0.47 '(0.12)	0.14 '(0.84)	-1.23 *** '(0.00)	-3.53 *** '(0.00)	-0.19 '(0.37)	0.26 '(0.20)	-0.68 '(0.14)	0.64 '(0.11)
L.shM3	-0.25 *** '(0.01)	-0.08 '(0.49)	-0.03 '(0.73)	0.30 '(0.18)	-1.16 *** '(0.01)	0.27 '(0.16)	1.08 ** '(0.04)	0.00 '(0.98)	0.07 ** '(0.03)	0.28 ** '(0.04)	-0.41 '(0.13)
L.stM3	0.23 *** '(0.00)	0.06 '(0.15)	0.08 *** '(0.01)	-0.01 '(0.83)	0.03 '(0.39)	-0.14 * '(0.09)	-0.12 '(0.50)	-0.11 ** '(0.03)	-0.09 *** '(0.00)	-0.04 '(0.61)	0.10 '(0.15)
Constant	0.06 * '(0.07)	-0.07 * '(0.07)	-0.03 '(0.41)	-0.05 '(0.33)	0.06 '(0.33)	0.07 ** '(0.05)	0.29 * '(0.09)	0.10 ** '(0.02)	0.02 '(0.62)	0.09 '(0.30)	-0.14 *** '(0.00)
F	1.64	0.91	1.03	1.31	1.75	1.06	0.78	2.36	1.58	3.35	1.90
R2	0.31	0.20	0.23	0.27	0.36	0.22	0.18	0.39	0.30	0.55	0.34
R2 adj.	0.12	-0.02	0.01	0.06	0.15	0.01	-0.05	0.23	0.11	0.39	0.16
N	154	149	136	148	139	155	148	150	149	120	150

Dependent variable: Labour productivity growth											
	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
L.shM	0.22 '(0.30)	0.12 '(0.43)	-0.26 '(0.23)	-0.36 '(0.18)	-0.14 '(0.83)	-1.39 *** '(0.00)	-3.76 *** '(0.00)	-0.23 '(0.22)	0.06 '(0.78)	-0.34 '(0.14)	0.01 '(0.99)
L.shM3	-0.24 ** '(0.02)	-0.05 '(0.66)	0.06 '(0.42)	0.22 '(0.28)	-0.92 ** '(0.03)	0.30 '(0.13)	1.32 ** '(0.02)	0.02 '(0.76)	0.08 *** '(0.01)	0.10 '(0.35)	-0.04 '(0.90)
L.stM3	0.17 *** '(0.01)	0.03 '(0.48)	0.07 *** '(0.01)	-0.02 '(0.63)	0.02 '(0.45)	-0.19 ** '(0.03)	-0.17 '(0.39)	-0.06 '(0.18)	-0.09 *** '(0.00)	0.04 '(0.61)	0.01 '(0.93)
Constant	0.07 ** '(0.03)	-0.03 '(0.46)	-0.01 '(0.84)	-0.04 '(0.50)	0.08 '(0.16)	0.10 ** '(0.01)	0.32 * '(0.08)	0.09 ** '(0.04)	0.05 '(0.14)	0.07 '(0.36)	0.08 * '(0.10)
F	1.37	0.98	1.28	1.60	1.94	1.00	0.83	1.81	3.18	3.91	1.69
R2	0.27	0.21	0.28	0.31	0.38	0.21	0.19	0.33	0.47	0.59	0.32
R2 adj.	0.07	0.00	0.06	0.12	0.18	0.00	-0.04	0.15	0.32	0.44	0.13
N	154	154	140	153	139	155	153	154	149	123	155

Dependent variable: Value added growth											
	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
L.shM	0.43 ** '(0.03)	0.29 * '(0.06)	-0.22 '(0.28)	-0.21 '(0.39)	0.72 '(0.39)	-0.74 * '(0.05)	-3.82 *** '(0.00)	-0.22 '(0.24)	-0.01 '(0.97)	-0.13 '(0.61)	-0.19 '(0.48)
L.shM3	-0.23 ** '(0.02)	-0.15 '(0.17)	0.08 '(0.25)	0.11 '(0.54)	-1.59 *** '(0.00)	0.13 '(0.45)	1.18 ** '(0.02)	0.03 '(0.69)	0.04 * '(0.08)	0.07 '(0.55)	-0.17 '(0.41)
L.stM3	0.26 *** '(0.00)	0.10 ** '(0.02)	0.04 '(0.11)	-0.01 '(0.81)	0.04 '(0.32)	-0.08 '(0.28)	-0.11 '(0.55)	-0.09 ** '(0.03)	-0.08 *** '(0.00)	0.13 '(0.13)	0.03 '(0.66)
Constant	0.02 '(0.51)	-0.06 * '(0.08)	-0.04 '(0.19)	-0.04 '(0.44)	0.05 '(0.46)	0.04 '(0.26)	0.33 * '(0.05)	0.09 ** '(0.03)	0.05 * '(0.08)	0.10 '(0.22)	-0.04 '(0.22)
F	1.66	1.40	1.91	2.15	1.77	1.04	0.91	2.00	2.23	3.02	3.83
R2	0.31	0.28	0.36	0.37	0.36	0.22	0.20	0.36	0.38	0.53	0.51
R2 adj.	0.13	0.08	0.17	0.20	0.16	0.01	-0.02	0.18	0.21	0.35	0.38
N	154	154	140	153	139	155	153	154	149	123	155

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Again we employ also different specifications. Table 12 reports the results when using lagged variables as explanatory factors. Similar to above the effects become more often negative and significant now, though there are some exceptions to this mainly with respect to variables shM3 and stM3, i.e. the high-educated shares of migrants in total high-educated employed and in total migrants, respectively.

Table 13

**Country-specific panel regressions using first differenced migrant variables**

Dependent variable: Total factor productivity growth											
	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
D.shM	-0.19 '(0.19)	-0.14 '(0.27)	0.26 '(0.24)	0.01 '(0.96)	0.83 '(0.14)	0.72 ** '(0.03)	1.31 * '(0.07)	0.27 * '(0.06)	-0.19 '(0.23)	0.96 *** '(0.00)	0.64 * '(0.07)
D.shM3	0.23 *** '(0.00)	0.06 '(0.45)	-0.04 '(0.67)	-0.15 '(0.34)	0.14 '(0.65)	-0.19 '(0.19)	-0.58 '(0.16)	-0.03 '(0.61)	-0.04 * '(0.05)	-0.20 ** '(0.02)	0.09 '(0.62)
D.stM3	-0.15 *** '(0.00)	-0.03 '(0.33)	-0.03 '(0.20)	-0.01 '(0.67)	0.01 '(0.70)	0.08 '(0.14)	0.25 '(0.14)	0.08 *** '(0.01)	0.00 '(0.98)	0.00 '(0.98)	-0.04 '(0.38)
Constant	0.09 *** '(0.01)	-0.01 '(0.07)	-0.10 * '(0.07)	-0.02 '(0.48)	0.01 '(0.75)	0.00 '(0.88)	-0.09 '(0.33)	-0.02 '(0.40)	-0.03 '(0.14)	-0.03 '(0.41)	-0.01 '(0.46)
F	1.72	0.84	0.95	1.19	1.47	0.92	0.59	2.51	1.39	4.01	2.17
R2	0.32	0.19	0.23	0.25	0.31	0.20	0.14	0.41	0.28	0.60	0.37
R2 adj.	0.14	-0.04	-0.01	0.04	0.10	-0.02	-0.10	0.24	0.08	0.45	0.20
N	153	148	130	147	135	155	147	150	149	120	150

Dependent variable: Labour productivity growth											
	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
D.shM	-0.21 '(0.20)	-0.10 '(0.36)	0.20 '(0.23)	0.01 '(0.97)	0.88 '(0.11)	0.84 ** '(0.02)	1.55 ** '(0.05)	0.23 * '(0.08)	-0.13 '(0.41)	0.69 *** '(0.00)	0.51 * '(0.10)
D.shM3	0.23 *** '(0.00)	0.06 '(0.42)	-0.02 '(0.77)	-0.07 '(0.57)	0.17 '(0.55)	-0.20 '(0.19)	-0.74 * '(0.09)	-0.03 '(0.51)	-0.05 ** '(0.01)	-0.15 * '(0.06)	0.04 '(0.84)
D.stM3	-0.11 ** '(0.01)	-0.03 '(0.33)	-0.04 * '(0.07)	0.01 '(0.72)	0.00 '(0.88)	0.11 * '(0.07)	0.30 * '(0.09)	0.05 * '(0.06)	0.01 '(0.60)	-0.01 '(0.92)	-0.02 '(0.71)
Constant	0.09 *** '(0.01)	0.03 '(0.22)	-0.06 '(0.28)	-0.02 '(0.58)	0.03 '(0.41)	0.02 '(0.53)	-0.03 '(0.79)	0.01 '(0.69)	-0.03 '(0.20)	0.18 *** '(0.00)	0.04 * '(0.09)
F	1.49	1.00	1.27	1.39	1.82	0.84	0.60	1.92	3.04	4.45	1.95
R2	0.29	0.22	0.29	0.28	0.35	0.19	0.14	0.35	0.46	0.63	0.35
R2 adj.	0.10	0.00	0.06	0.08	0.16	-0.04	-0.10	0.17	0.31	0.49	0.17
N	153	153	133	152	135	155	152	153	149	122	155

Dependent variable: Value added growth											
	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
D.shM	-0.30 ** '(0.05)	-0.18 '(0.10)	0.13 '(0.40)	-0.02 '(0.93)	0.70 '(0.31)	0.49 * '(0.09)	1.28 * '(0.07)	0.22 * '(0.08)	-0.05 '(0.72)	0.78 *** '(0.00)	0.20 '(0.35)
D.shM3	0.24 *** '(0.00)	0.05 '(0.47)	-0.05 '(0.51)	-0.08 '(0.50)	0.56 '(0.13)	-0.13 '(0.30)	-0.35 '(0.38)	-0.03 '(0.49)	-0.03 * '(0.10)	-0.14 '(0.11)	0.12 '(0.39)
D.stM3	-0.20 *** '(0.00)	-0.04 '(0.18)	-0.01 '(0.47)	-0.01 '(0.82)	-0.01 '(0.71)	0.06 '(0.24)	0.15 '(0.35)	0.07 *** '(0.01)	0.03 '(0.26)	-0.09 '(0.13)	-0.01 '(0.90)
Constant	0.06 * '(0.08)	0.00 '(0.93)	-0.02 '(0.71)	0.00 '(0.96)	0.02 '(0.64)	-0.01 '(0.81)	-0.02 '(0.85)	0.01 '(0.69)	-0.04 ** '(0.04)	0.24 *** '(0.00)	0.00 '(0.93)
F	1.88	1.29	1.71	2.01	1.58	1.00	0.55	2.11	1.99	3.85	3.96
R2	0.34	0.26	0.35	0.36	0.32	0.22	0.13	0.37	0.36	0.59	0.52
R2 adj.	0.16	0.06	0.15	0.18	0.12	0.00	-0.11	0.19	0.18	0.44	0.39
N	153	153	133	152	135	155	152	153	149	122	155

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Finally, we present the results when regressing on the first differences of the migrant shares on the right hand side. Results are reported in Table 13. Again we find more often significantly positive effects of changes in the migrant shares. Notably the change in the share of migrants shows a positive significant effect in France, Ireland, Netherlands, Sweden and UK. The change in the share of high-educated migrants in total high-educated employed persons is positive and strongly significant in Austria but slightly negative in the case of Portugal. The change in the share of high-educated migrants in total migrants is negatively significant in Austria, but positively significant in the

Netherlands. With respect to labour productivity growth we find similar results; these are however more often significant (the second variable, shM3, negatively so in most cases, and the third, stM3, positively significant). This is also the case when testing for the effects of migration on value added growth.

Finally, we also run the same set of regressions excluding either the share of high-educated migrants in total high educated employed persons (shM3) or the share of migrants in total employed for reasons of multicollinearity. In these cases the results are more mixed across countries. In particular, we find in some cases significantly positive effects when including the share of migrants along with the share of high-educated migrants in total migrants only. These results are reported as Appendix Tables B.4 and B.5, respectively.

### **3.1.4 Econometric results on subsectors**

We proceed with the analysis by splitting the sample into manufacturing (NACE rev. 1 15-37) and market services (NACE rev.1 50-74). Further, we split the sample by skill intensities based on the taxonomy suggested by Pender (2007) which was adapted to the EU KLEMS sectoral classification. The exact list of industries and the underlying taxonomy is provided in Appendix Table B.6. Here we differentiate between high, medium and low-skill intensive industries. The reason for splitting up the sample to groups of sectors is that one might expect that migrants might be concentrated in particular jobs (or sectors) which might have a differentiated impact. Further, the effect of migrant labour might be more important in some sectors compared to others (e.g. potential of spillover effects, learning requirements, ...). Furthermore, recent results suggest a differentiated impact (see e.g. Paserman, 2008).

In this part we can no longer estimate the impact of migrant labour on a country-by-country basis due the limited number of observations available. More importantly, it might even be more interesting to focus on cross-country differences, i.e. asking whether in a particular sector (or a group of sectors sharing particular characteristics) the impact of migrant labour on industry performance matters in a positive way. With respect to specifications we again present first cross-country results and then panel regression results.

#### **3.1.4.1 Cross-section results**

In Table 14 we report the results for manufacturing and in Table 15 the results for service industries. Again we report twelve different specifications which differ with respect to the variables included. In case of manufacturing we find again a positive impact of migration on total factor productivity and also labour productivity growth at least at the 10 % significance level. However, in most cases the significance vanishes when including both country and industry dummies. With respect to the variables it seems that the skill structure of migrants

seems to be the most important one. We also find a significant positive effect on value added growth; in this case it is mainly the variable capturing the share of high-educated migrants in total migrants which matters. For service industries we find no evidence for total factor productivity growth. Results are inconclusive and in some cases even negative for labour productivity growth. However, the significance vanishes when including industry and/or country dummies. Only for value added growth we find a positive impact, again mainly for the variable on the structure of migrants (stM3).

Tables 16 and 17 report the results for industries classified as low-educational intensive and high-educational intensive, respectively.<sup>4</sup> As one can see, results for low-educational intensive industries are rather mixed, in most cases not significant and in some cases even negative. The exception to this is the share of high-educated migrants in total migrants which often is positively significant for labour productivity growth as dependent variable. This is quite different when looking at the results for high-educational intensive industries. For this group of industries we find in many cases positive and strongly significant effects on all three dependent variables. In particular, the share of high-educated migrants in total high-educated employed persons is strongly significant also with a rather large impact. These results are in line with those found in Paserman (2008) for example.

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<sup>4</sup> Results for medium educational intensive industries are available upon request.

Table 14

## Cross-section results for manufacturing industries

Dependent variable: Total factor productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	0.11 '(0.16)	0.03 '(0.77)	0.10 '(0.22)	0.03 '(0.81)	0.14 ** '(0.04)	0.03 '(0.73)	0.14 * '(0.05)	0.04 '(0.75)				
shM3	0.03 '(0.49)	0.00 '(0.95)	0.04 '(0.47)	0.01 '(0.86)					0.07 * '(0.09)	0.01 '(0.85)	0.07 * '(0.09)	0.02 '(0.78)
stM3	0.03 '(0.25)	0.04 '(0.12)	0.02 '(0.57)	0.03 '(0.41)	0.03 * '(0.06)	0.04 ** '(0.04)	0.03 '(0.21)	0.03 '(0.20)	0.01 '(0.49)	0.04 '(0.13)	0.00 '(0.96)	0.03 '(0.42)
F	2.77	2.63	1.04	1.62	3.93	2.87	1.08	1.70	3.12	2.86	1.00	1.70
R2	0.06	0.22	0.12	0.28	0.06	0.22	0.11	0.28	0.05	0.22	0.11	0.27
R2 adj.	0.04	0.14	0.01	0.11	0.04	0.15	0.01	0.11	0.03	0.15	0.00	0.11
N	133	133	133	133	133	133	133	133	133	133	133	133
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Dependent variable: Labour productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	0.07 '(0.35)	0.05 '(0.62)	0.04 '(0.66)	0.04 '(0.77)	0.12 * '(0.06)	0.07 '(0.53)	0.11 '(0.11)	0.07 '(0.53)				
shM3	0.06 '(0.23)	0.01 '(0.79)	0.08 '(0.10)	0.05 '(0.34)					0.08 ** '(0.04)	0.02 '(0.63)	0.09 ** '(0.03)	0.06 '(0.27)
stM3	0.02 '(0.32)	0.03 '(0.19)	-0.00 '(0.87)	-0.01 '(0.85)	0.04 ** '(0.04)	0.04 * '(0.05)	0.02 '(0.31)	0.02 '(0.53)	0.02 '(0.48)	0.03 '(0.21)	-0.01 '(0.70)	-0.01 '(0.82)
F	3.05	2.64	1.32	1.86	3.82	2.88	1.20	1.90	4.13	2.86	1.41	1.95
R2	0.07	0.22	0.14	0.30	0.06	0.22	0.12	0.30	0.06	0.22	0.14	0.30
R2 adj.	0.04	0.14	0.04	0.14	0.04	0.15	0.02	0.14	0.05	0.15	0.04	0.15
N	133	133	133	133	133	133	133	133	133	133	133	133
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Dependent variable: Value added growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	0.06 '(0.50)	-0.07 '(0.55)	0.09 '(0.30)	0.11 '(0.37)	0.09 '(0.19)	-0.08 '(0.44)	0.15 ** '(0.04)	0.12 '(0.30)				
shM3	0.04 '(0.44)	-0.02 '(0.75)	0.06 '(0.22)	0.01 '(0.80)					0.06 '(0.18)	-0.03 '(0.57)	0.09 ** '(0.03)	0.03 '(0.57)
stM3	0.04 * '(0.08)	0.07 *** '(0.01)	0.03 '(0.37)	0.05 '(0.16)	0.05 *** '(0.01)	0.07 *** '(0.00)	0.05 ** '(0.04)	0.05 ** '(0.03)	0.04 '(0.11)	0.08 *** '(0.00)	0.01 '(0.62)	0.04 '(0.19)
F	3.08	3.42	2.54	3.19	4.34	3.73	2.60	3.35	4.41	3.70	2.65	3.29
R2	0.07	0.27	0.25	0.43	0.06	0.27	0.24	0.43	0.06	0.27	0.24	0.42
R2 adj.	0.05	0.19	0.15	0.29	0.05	0.20	0.15	0.30	0.05	0.20	0.15	0.29
N	133	133	133	133	133	133	133	133	133	133	133	133
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Table 15

## Cross-section results for service industries

Dependent variable: Total factor productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	-0.06	-0.16	0.10	0.07	-0.05	-0.15	0.08	0.07				
	'(0.50)	'(0.14)	'(0.23)	'(0.51)	'(0.50)	'(0.11)	'(0.21)	'(0.48)				
shM3	0.02	0.02	-0.03	0.00					-0.01	-0.04	0.03	0.02
	'(0.79)	'(0.84)	'(0.68)	'(0.98)					'(0.80)	'(0.54)	'(0.59)	'(0.81)
stM3	0.03	0.03	0.02	0.02	0.03	0.03	0.01	0.02	0.03 *	0.04 *	0.01	0.01
	'(0.15)	'(0.17)	'(0.41)	'(0.45)	'(0.14)	'(0.17)	'(0.45)	'(0.42)	'(0.09)	'(0.07)	'(0.64)	'(0.54)
F	1.21	0.88	6.40	3.03	1.81	0.97	7.40	3.28	1.60	0.75	7.06	3.23
R2	0.06	0.18	0.47	0.54	0.05	0.18	0.47	0.54	0.05	0.15	0.46	0.53
R2 adj.	0.01	-0.02	0.40	0.36	0.02	-0.01	0.41	0.37	0.02	-0.05	0.40	0.37
N	66	66	66	66	66	66	66	66	66	66	66	66
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Dependent variable: Labour productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	-0.14	-0.23 *	0.06	0.06	-0.11	-0.24 **	0.05	0.04				
	'(0.21)	'(0.06)	'(0.51)	'(0.61)	'(0.18)	'(0.03)	'(0.42)	'(0.70)				
shM3	0.03	-0.01	-0.01	-0.05					-0.04	-0.10	0.02	-0.03
	'(0.69)	'(0.89)	'(0.92)	'(0.61)					'(0.54)	'(0.23)	'(0.63)	'(0.71)
stM3	0.03	0.04	-0.00	0.02	0.03	0.04	-0.00	0.02	0.03	0.06 **	-0.01	0.02
	'(0.28)	'(0.14)	'(0.96)	'(0.42)	'(0.27)	'(0.14)	'(0.94)	'(0.49)	'(0.14)	'(0.04)	'(0.78)	'(0.49)
F	1.52	1.07	8.72	3.89	2.24	1.18	10.14	4.16	1.47	0.82	10.00	4.16
R2	0.07	0.21	0.55	0.60	0.07	0.21	0.55	0.60	0.04	0.16	0.55	0.60
R2 adj.	0.02	0.01	0.49	0.44	0.04	0.03	0.50	0.45	0.01	-0.03	0.49	0.45
N	66	66	66	66	66	66	66	66	66	66	66	66
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Dependent variable: Value added growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	-0.02	-0.04	0.05	0.11	-0.06	-0.09	0.02	0.10				
	'(0.78)	'(0.70)	'(0.56)	'(0.25)	'(0.31)	'(0.24)	'(0.73)	'(0.28)				
shM3	-0.04	-0.08	-0.03	-0.03					-0.05	-0.10 *	-0.01	-0.01
	'(0.49)	'(0.20)	'(0.62)	'(0.66)					'(0.23)	'(0.09)	'(0.90)	'(0.93)
stM3	0.05 ***	0.05 **	0.03 *	0.03	0.05 ***	0.05 **	0.03 *	0.02	0.06 ***	0.05 ***	0.03	0.02
	'(0.00)	'(0.01)	'(0.09)	'(0.25)	'(0.00)	'(0.01)	'(0.09)	'(0.28)	'(0.00)	'(0.01)	'(0.10)	'(0.39)
F	4.50	2.04	4.80	3.31	6.56	2.05	5.52	3.55	6.81	2.23	5.50	3.40
R2	0.18	0.34	0.40	0.56	0.17	0.32	0.40	0.56	0.18	0.34	0.40	0.55
R2 adj.	0.14	0.17	0.32	0.39	0.15	0.16	0.33	0.40	0.15	0.19	0.33	0.39
N	66	66	66	66	66	66	66	66	66	66	66	66
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.



Table 16

## Cross-section results for low-educational intensive industries

Dependent variable: Total factor productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	0.02 '(0.65)	-0.07 '(0.25)	0.04 '(0.51)	-0.08 '(0.30)	-0.05 '(0.18)	-0.09 ** '(0.04)	-0.01 '(0.78)	-0.05 '(0.41)				
shM3	-0.07 ** '(0.02)	-0.02 '(0.65)	-0.06 * '(0.09)	0.03 '(0.52)					-0.06 *** '(0.01)	-0.05 * '(0.07)	-0.04 '(0.11)	0.00 '(0.94)
stM3	0.03 '(0.28)	0.01 '(0.85)	0.03 '(0.33)	-0.01 '(0.73)	0.00 '(0.94)	-0.00 '(0.93)	0.01 '(0.72)	0.00 '(0.99)	0.02 '(0.33)	0.02 '(0.44)	0.02 '(0.44)	0.00 '(0.93)
F	2.55	2.89	1.78	2.82	0.96	3.14	1.63	2.96	3.75	3.00	1.93	2.90
R2	0.08	0.31	0.19	0.44	0.02	0.31	0.16	0.44	0.07	0.30	0.18	0.43
R2 adj.	0.05	0.20	0.08	0.29	-0.00	0.21	0.06	0.29	0.05	0.20	0.09	0.28
N	97	97	97	97	97	97	97	97	97	97	97	97
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Dependent variable: Labour productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	0.02 '(0.67)	-0.03 '(0.69)	0.04 '(0.43)	0.01 '(0.87)	-0.02 '(0.64)	-0.04 '(0.38)	0.04 '(0.34)	0.07 '(0.25)				
shM3	-0.05 '(0.15)	-0.02 '(0.68)	0.01 '(0.83)	0.08 ** '(0.05)					-0.04 '(0.14)	-0.03 '(0.38)	0.02 '(0.56)	0.08 ** '(0.02)
stM3	0.05 ** '(0.03)	0.03 '(0.26)	0.04 ** '(0.03)	0.00 '(0.89)	0.03 * '(0.07)	0.02 '(0.28)	0.04 ** '(0.01)	0.02 '(0.17)	0.04 ** '(0.02)	0.03 '(0.16)	0.03 ** '(0.04)	0.00 '(0.93)
F	2.23	1.98	3.59	4.06	2.25	2.16	3.99	3.89	3.27	2.16	3.91	4.31
R2	0.07	0.24	0.32	0.53	0.05	0.23	0.32	0.50	0.06	0.23	0.31	0.53
R2 adj.	0.04	0.12	0.23	0.40	0.03	0.13	0.24	0.37	0.05	0.13	0.23	0.41
N	98	98	98	98	98	98	98	98	98	98	98	98
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Dependent variable: Value added growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	-0.12 * '(0.06)	-0.13 '(0.11)	-0.08 '(0.18)	-0.08 '(0.29)	-0.10 ** '(0.03)	-0.12 ** '(0.03)	-0.06 '(0.20)	-0.07 '(0.20)				
shM3	0.02 '(0.63)	0.01 '(0.81)	0.02 '(0.57)	0.00 '(0.94)					-0.04 '(0.22)	-0.05 '(0.15)	-0.01 '(0.73)	-0.03 '(0.48)
stM3	-0.01 '(0.56)	-0.02 '(0.23)	0.02 '(0.35)	0.00 '(0.82)	-0.01 '(0.66)	-0.02 '(0.23)	0.02 '(0.24)	0.00 '(0.78)	0.00 '(0.81)	-0.01 '(0.51)	0.03 * '(0.09)	0.01 '(0.49)
F	1.73	1.92	5.90	5.09	2.50	2.10	6.51	5.41	0.77	1.83	6.24	5.28
R2	0.05	0.23	0.43	0.58	0.05	0.23	0.43	0.58	0.02	0.21	0.42	0.58
R2 adj.	0.02	0.11	0.36	0.47	0.03	0.12	0.36	0.48	-0.01	0.09	0.35	0.47
N	98	98	98	98	98	98	98	98	98	98	98	98
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Table 17

## Cross-section results for high-educational intensive industries

Dependent variable: Total factor productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	-0.24 '(0.18)	-0.31 '(0.11)	-0.15 '(0.44)	-0.18 '(0.43)	0.22 * '(0.05)	0.05 '(0.73)	0.27 ** '(0.02)	0.17 '(0.35)				
shM3	0.48 *** '(0.00)	0.49 *** '(0.00)	0.43 *** '(0.01)	0.48 ** '(0.02)					0.32 *** '(0.00)	0.31 ** '(0.02)	0.33 *** '(0.00)	0.38 ** '(0.01)
stM3	-0.02 '(0.44)	-0.03 '(0.31)	0.01 '(0.71)	0.02 '(0.65)	0.01 '(0.60)	-0.01 '(0.80)	0.07 ** '(0.02)	0.10 ** '(0.03)	-0.01 '(0.79)	-0.01 '(0.61)	0.03 '(0.35)	0.04 '(0.33)
F	4.98	1.81	4.06	2.56	1.93	1.15	3.45	2.23	6.47	1.70	4.47	2.68
R2	0.15	0.24	0.35	0.44	0.04	0.16	0.29	0.39	0.13	0.22	0.34	0.43
R2 adj.	0.12	0.11	0.26	0.27	0.02	0.02	0.20	0.21	0.11	0.09	0.27	0.27
N	87	87	87	87	87	87	87	87	87	87	87	87
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Dependent variable: Labour productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	-0.12 '(0.57)	-0.03 '(0.92)	-0.05 '(0.81)	0.07 '(0.79)	0.23 * '(0.05)	0.26 '(0.11)	0.23 * '(0.06)	0.34 * '(0.08)				
shM3	0.35 * '(0.05)	0.31 '(0.13)	0.27 '(0.15)	0.28 '(0.19)					0.26 *** '(0.01)	0.29 ** '(0.03)	0.23 ** '(0.02)	0.32 ** '(0.03)
stM3	-0.03 '(0.26)	-0.05 * '(0.09)	0.01 '(0.69)	0.00 '(0.96)	-0.01 '(0.59)	-0.04 '(0.15)	0.04 '(0.19)	0.02 '(0.48)	-0.03 '(0.31)	-0.05 * '(0.08)	0.02 '(0.56)	-0.00 '(0.97)
F	2.77	1.82	4.01	3.04	2.16	1.75	4.15	3.08	4.03	2.00	4.50	3.25
R2	0.09	0.25	0.35	0.48	0.05	0.22	0.33	0.47	0.09	0.25	0.35	0.48
R2 adj.	0.06	0.11	0.26	0.32	0.03	0.09	0.25	0.31	0.07	0.12	0.27	0.33
N	87	87	87	87	87	87	87	87	87	87	87	87
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Dependent variable: Value added growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	-0.12 '(0.51)	-0.02 '(0.93)	-0.06 '(0.77)	0.08 '(0.74)	0.20 * '(0.07)	0.18 '(0.24)	0.23 * '(0.07)	0.24 '(0.23)				
shM3	0.33 ** '(0.02)	0.29 * '(0.09)	0.28 * '(0.09)	0.27 '(0.18)					0.26 *** '(0.00)	0.28 ** '(0.04)	0.24 ** '(0.01)	0.31 * '(0.08)
stM3	0.02 '(0.47)	0.00 '(0.90)	0.03 '(0.46)	-0.02 '(0.73)	0.03 '(0.19)	0.01 '(0.72)	0.05 '(0.13)	0.01 '(0.87)	0.02 '(0.28)	0.00 '(0.87)	0.03 '(0.33)	-0.02 '(0.66)
F	3.18	1.77	1.35	1.38	1.98	1.62	1.16	1.34	4.58	1.94	1.51	1.46
R2	0.10	0.24	0.15	0.29	0.05	0.21	0.12	0.28	0.10	0.24	0.15	0.29
R2 adj.	0.07	0.10	0.04	0.08	0.02	0.08	0.02	0.07	0.08	0.12	0.05	0.09
N	87	87	87	87	87	87	87	87	87	87	87	87
Country dummies	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

When using panel fixed effects regressions (Tables 18 and 19 report the results for contemporaneous variables for manufacturing and services respectively) we again find a significant and positive role for the share of migrants on total factor productivity and labour productivity growth in manufacturing industries, but not so for value added growth. For service industries these effects are even stronger; in particular the structure of migration (i.e. the share of high-educated migrants in total migrants) is often positively significant with total factor productivity growth as dependent variable; but also so for value added growth though to a less extent. These conclusions also hold when using lagged variables as explanatory factors. In some cases, however, the effects then become even negative. When using first differences as independent variables we find often significantly positive effects in manufacturing industries, for services however only the change in the share of migrants is positively related to labour productivity growth.

In Tables 20 and 21 we show similar results however distinguishing between low-educational intensive and high-educational intensive industries. With respect to the former group of industries we often find insignificant and sometimes negative effects. Again this is quite different for high-educational intensive industries. Here the coefficients are positive and significant for all three dependent variables and also in most of the specifications. The results further suggest that the share of high-educated migrants relative to total high-educated persons employed (shM3) matters most. Similar conclusions hold when using lagged variables (though significance sometimes disappears when including industry dummies). Somewhat contrary to the results so far however the first differences variables are not particularly important.<sup>5</sup>

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<sup>5</sup> Further results using lagged dependent variables and first differenced regressors are available upon request.

Table 18

## Panel regression results for manufacturing industries

## Dependent variable: Total factor productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	0.16 **	0.25 **	0.23 **	0.16	0.16 **	0.25 ***	0.24 **	0.18 *				
	'(0.03)	'(0.02)	'(0.05)	'(0.17)	'(0.01)	'(0.01)	'(0.02)	'(0.09)				
shM3	0.00	0.01	0.02	0.03					0.04	0.05	0.06	0.05
	'(0.96)	'(0.89)	'(0.68)	'(0.60)					'(0.23)	'(0.28)	'(0.20)	'(0.26)
stM3	0.01	0.02	0.01	-0.01	0.01	0.02	0.01	0.00	0.00	0.01	-0.01	-0.02
	'(0.46)	'(0.31)	'(0.82)	'(0.85)	'(0.44)	'(0.23)	'(0.58)	'(0.91)	'(0.99)	'(0.72)	'(0.65)	'(0.48)
F	2.19	3.11	1.87	1.92	3.28	3.37	1.94	1.99	0.78	2.87	1.77	1.92
R2	0.01	0.06	0.07	0.08	0.01	0.06	0.07	0.08	0.00	0.05	0.06	0.08
R2 adj.	0.01	0.04	0.03	0.04	0.01	0.04	0.03	0.04	0.00	0.03	0.03	0.04
N	679	679	679	679	679	679	679	679	679	679	679	679
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

## Dependent variable: Labour productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	0.15 *	0.27 **	0.25 **	0.18	0.16 **	0.27 ***	0.25 **	0.19 *				
	'(0.05)	'(0.01)	'(0.04)	'(0.13)	'(0.02)	'(0.01)	'(0.02)	'(0.08)				
shM3	0.01	-0.01	0.01	0.01					0.05	0.04	0.05	0.04
	'(0.83)	'(0.90)	'(0.85)	'(0.78)					'(0.17)	'(0.38)	'(0.28)	'(0.36)
stM3	0.03	0.04 *	0.02	0.01	0.03 *	0.04 **	0.03	0.02	0.02	0.02	0.01	0.00
	'(0.12)	'(0.05)	'(0.35)	'(0.59)	'(0.08)	'(0.03)	'(0.21)	'(0.41)	'(0.33)	'(0.20)	'(0.80)	'(0.98)
F	2.52	2.86	1.83	1.82	3.76	3.10	1.91	1.88	1.85	2.53	1.72	1.80
R2	0.01	0.05	0.07	0.08	0.01	0.05	0.07	0.08	0.01	0.04	0.06	0.07
R2 adj.	0.01	0.03	0.03	0.03	0.01	0.04	0.03	0.04	0.00	0.03	0.03	0.03
N	679	679	679	679	679	679	679	679	679	679	679	679
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

## Dependent variable: Value added growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	0.08	0.09	0.16	0.13	0.09	0.08	0.18 *	0.16				
	'(0.30)	'(0.37)	'(0.16)	'(0.28)	'(0.19)	'(0.43)	'(0.07)	'(0.14)				
shM3	0.01	-0.02	0.03	0.04					0.03	-0.01	0.05	0.06
	'(0.82)	'(0.66)	'(0.55)	'(0.44)					'(0.40)	'(0.90)	'(0.21)	'(0.20)
stM3	0.02	0.03	-0.01	-0.01	0.02	0.03	0.00	0.00	0.01	0.02	-0.02	-0.02
	'(0.30)	'(0.13)	'(0.85)	'(0.65)	'(0.23)	'(0.14)	'(0.87)	'(0.97)	'(0.46)	'(0.18)	'(0.49)	'(0.38)
F	0.91	2.88	2.86	2.78	1.34	3.11	2.97	2.86	0.83	3.06	2.90	2.84
R2	0.00	0.05	0.10	0.11	0.00	0.05	0.10	0.11	0.00	0.05	0.10	0.11
R2 adj.	0.00	0.04	0.06	0.07	0.00	0.04	0.07	0.07	0.00	0.04	0.06	0.07
N	679	679	679	679	679	679	679	679	679	679	679	679
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Table 19

## Panel regression results for service industries

## Dependent variable: Total factor productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	-0.02	-0.09	0.22 **	0.19 **	-0.03	-0.08	0.16 **	0.14 *				
	'(0.80)	'(0.25)	'(0.01)	'(0.04)	'(0.46)	'(0.20)	'(0.04)	'(0.08)				
shM3	-0.01	0.01	-0.08	-0.07					-0.02	-0.02	0.00	-0.01
	'(0.75)	'(0.78)	'(0.20)	'(0.25)					'(0.45)	'(0.52)	'(0.98)	'(0.90)
stM3	0.05 ***	0.06 ***	0.07 ***	0.07 **	0.05 ***	0.06 ***	0.06 **	0.05 **	0.05 ***	0.07 ***	0.05 *	0.05 *
	'(0.00)	'(0.00)	'(0.01)	'(0.01)	'(0.00)	'(0.00)	'(0.02)	'(0.03)	'(0.00)	'(0.00)	'(0.05)	'(0.06)
F	4.28	2.09	5.13	4.30	6.39	2.27	5.33	4.44	6.41	2.15	5.00	4.25
R2	0.04	0.08	0.23	0.24	0.04	0.08	0.23	0.24	0.04	0.08	0.22	0.23
R2 adj.	0.03	0.04	0.19	0.18	0.03	0.05	0.19	0.18	0.03	0.04	0.17	0.18
N	324	324	324	324	324	324	324	324	324	324	324	324
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

## Dependent variable: Labour productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	-0.05	-0.10	0.31 ***	0.32 ***	-0.08	-0.13 **	0.23 ***	0.24 ***				
	'(0.49)	'(0.26)	'(0.00)	'(0.00)	'(0.14)	'(0.04)	'(0.01)	'(0.01)				
shM3	-0.02	-0.03	-0.11	-0.10					-0.05	-0.07 *	0.00	0.01
	'(0.69)	'(0.57)	'(0.11)	'(0.13)					'(0.17)	'(0.08)	'(0.98)	'(0.94)
stM3	0.04 **	0.05 **	0.05 *	0.05 *	0.04 **	0.05 **	0.03	0.03	0.04 ***	0.06 ***	0.02	0.02
	'(0.02)	'(0.01)	'(0.08)	'(0.08)	'(0.02)	'(0.01)	'(0.25)	'(0.22)	'(0.01)	'(0.00)	'(0.46)	'(0.45)
F	3.56	1.90	6.59	5.36	5.27	2.04	6.79	5.47	5.10	1.95	6.20	4.98
R2	0.03	0.07	0.28	0.28	0.03	0.07	0.27	0.28	0.03	0.07	0.26	0.26
R2 adj.	0.02	0.04	0.24	0.23	0.03	0.04	0.23	0.23	0.03	0.03	0.22	0.21
N	324	324	324	324	324	324	324	324	324	324	324	324
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

## Dependent variable: Value added growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	0.05	0.04	0.24 ***	0.22 ***	-0.02	-0.06	0.15 **	0.15 **				
	'(0.38)	'(0.56)	'(0.01)	'(0.01)	'(0.58)	'(0.28)	'(0.04)	'(0.04)				
shM3	-0.07 *	-0.09 **	-0.11 *	-0.09					-0.04	-0.08 **	-0.03	-0.01
	'(0.09)	'(0.04)	'(0.06)	'(0.13)					'(0.12)	'(0.02)	'(0.58)	'(0.79)
stM3	0.08 ***	0.07 ***	0.06 **	0.06 **	0.08 ***	0.07 ***	0.04 *	0.04 *	0.08 ***	0.06 ***	0.04	0.04
	'(0.00)	'(0.00)	'(0.02)	'(0.02)	'(0.00)	'(0.00)	'(0.08)	'(0.07)	'(0.00)	'(0.00)	'(0.12)	'(0.12)
F	13.94	3.93	5.18	4.97	19.36	3.85	5.22	5.07	20.54	4.24	4.92	4.80
R2	0.12	0.14	0.23	0.27	0.11	0.13	0.23	0.26	0.11	0.14	0.21	0.25
R2 adj.	0.11	0.11	0.19	0.21	0.10	0.10	0.18	0.21	0.11	0.11	0.17	0.20
N	324	324	324	324	324	324	324	324	324	324	324	324
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Table 20

## Panel regression results for low-educational intensive industries

## Dependent variable: Total factor productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	0.06 '(0.18)	0.05 '(0.45)	0.11 '(0.15)	0.10 '(0.20)	-0.04 '(0.25)	-0.04 '(0.34)	0.05 '(0.39)	0.05 '(0.45)				
shM3	-0.10 *** '(0.00)	-0.07 * '(0.05)	-0.05 '(0.19)	-0.05 '(0.23)					-0.07 *** '(0.00)	-0.05 ** '(0.04)	-0.02 '(0.53)	-0.02 '(0.57)
stM3	0.05 *** '(0.01)	0.04 * '(0.06)	0.04 '(0.15)	0.03 '(0.22)	0.03 '(0.17)	0.02 '(0.33)	0.02 '(0.40)	0.01 '(0.49)	0.04 ** '(0.02)	0.04 * '(0.09)	0.02 '(0.35)	0.02 '(0.44)
F	4.60	3.12	2.84	2.77	1.83	3.04	2.89	2.82	6.01	3.34	2.87	2.81
R2	0.03	0.08	0.12	0.13	0.01	0.07	0.11	0.13	0.03	0.08	0.11	0.13
R2 adj.	0.02	0.05	0.07	0.08	0.00	0.05	0.07	0.08	0.02	0.06	0.07	0.08
N	481	481	481	481	481	481	481	481	481	481	481	481
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

## Dependent variable: Labour productivity growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	0.06 '(0.25)	0.07 '(0.31)	0.13 * '(0.09)	0.13 * '(0.09)	-0.05 '(0.21)	-0.05 '(0.30)	0.07 '(0.29)	0.07 '(0.25)				
shM3	-0.10 *** '(0.00)	-0.09 ** '(0.02)	-0.06 '(0.15)	-0.05 '(0.19)					-0.07 *** '(0.00)	-0.07 ** '(0.02)	-0.02 '(0.55)	-0.02 '(0.65)
stM3	0.06 *** '(0.01)	0.05 ** '(0.03)	0.04 '(0.14)	0.04 '(0.16)	0.03 '(0.13)	0.02 '(0.27)	0.02 '(0.41)	0.02 '(0.41)	0.05 ** '(0.01)	0.04 * '(0.05)	0.02 '(0.38)	0.02 '(0.44)
F	4.64	2.77	3.27	3.01	2.26	2.50	3.32	3.06	6.28	2.92	3.28	3.00
R2	0.03	0.07	0.13	0.14	0.01	0.06	0.13	0.14	0.03	0.07	0.13	0.14
R2 adj.	0.02	0.05	0.09	0.10	0.01	0.04	0.09	0.09	0.02	0.05	0.09	0.09
N	481	481	481	481	481	481	481	481	481	481	481	481
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

## Dependent variable: Value added growth

	1	2	3	4	5	6	7	8	9	10	11	12
shM	0.01 '(0.89)	-0.01 '(0.91)	0.09 '(0.23)	0.08 '(0.31)	-0.04 '(0.30)	-0.04 '(0.44)	0.04 '(0.47)	0.04 '(0.54)				
shM3	-0.04 '(0.19)	-0.02 '(0.56)	-0.04 '(0.28)	-0.04 '(0.37)					-0.04 * '(0.10)	-0.03 '(0.33)	-0.02 '(0.62)	-0.01 '(0.68)
stM3	0.03 '(0.19)	0.01 '(0.74)	0.04 '(0.16)	0.03 '(0.22)	0.02 '(0.41)	0.00 '(0.98)	0.02 '(0.32)	0.02 '(0.38)	0.03 '(0.17)	0.01 '(0.68)	0.02 '(0.30)	0.02 '(0.38)
F	1.25	2.08	4.57	4.60	1.02	2.23	4.74	4.76	1.87	2.26	4.72	4.75
R2	0.01	0.06	0.17	0.20	0.00	0.05	0.17	0.20	0.01	0.06	0.17	0.20
R2 adj.	0.00	0.03	0.14	0.16	0.00	0.03	0.14	0.16	0.00	0.03	0.13	0.16
N	481	481	481	481	481	481	481	481	481	481	481	481
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Table 21

## Panel regression results for high-educational intensive industries

Dependent variable: Total factor productivity growth												
	1	2	3	4	5	6	7	8	9	10	11	12
shM	-0.06	-0.11	0.15	0.06	0.17 **	0.12	0.27 **	0.22 *				
	'(0.62)	'(0.43)	'(0.35)	'(0.70)	'(0.01)	'(0.23)	'(0.03)	'(0.09)				
shM3	0.22 **	0.25 **	0.13	0.16					0.18 ***	0.20 ***	0.20 **	0.19 **
	'(0.01)	'(0.01)	'(0.22)	'(0.14)					'(0.00)	'(0.01)	'(0.02)	'(0.03)
stM3	0.00	-0.02	0.04	0.03	0.01	-0.01	0.06 **	0.05 **	0.00	-0.02	0.03	0.03
	'(0.78)	'(0.30)	'(0.15)	'(0.25)	'(0.72)	'(0.63)	'(0.03)	'(0.04)	'(0.89)	'(0.38)	'(0.24)	'(0.28)
F	4.02	2.86	4.78	4.28	3.02	2.55	4.95	4.36	5.92	3.05	4.99	4.47
R2	0.03	0.08	0.19	0.20	0.01	0.07	0.19	0.20	0.03	0.08	0.19	0.20
R2 adj.	0.02	0.05	0.15	0.16	0.01	0.04	0.15	0.15	0.02	0.05	0.15	0.16
N	432	432	432	432	432	432	432	432	432	432	432	432
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes
Dependent variable: Labour productivity growth												
	1	2	3	4	5	6	7	8	9	10	11	12
shM	-0.13	-0.13	0.12	0.07	0.17 **	0.13	0.24 *	0.21 *				
	'(0.27)	'(0.35)	'(0.44)	'(0.66)	'(0.02)	'(0.19)	'(0.05)	'(0.09)				
shM3	0.29 ***	0.29 ***	0.12	0.15					0.20 ***	0.22 ***	0.18 **	0.18 **
	'(0.00)	'(0.00)	'(0.26)	'(0.18)					'(0.00)	'(0.00)	'(0.04)	'(0.03)
stM3	-0.02	-0.04 **	0.03	0.03	-0.01	-0.03	0.05 *	0.05 *	-0.02	-0.04 **	0.03	0.02
	'(0.19)	'(0.03)	'(0.24)	'(0.33)	'(0.60)	'(0.11)	'(0.06)	'(0.07)	'(0.30)	'(0.04)	'(0.34)	'(0.38)
F	5.25	3.52	6.77	5.90	3.04	3.09	7.06	6.07	7.26	3.74	7.10	6.16
R2	0.04	0.10	0.25	0.26	0.01	0.08	0.25	0.26	0.03	0.10	0.25	0.26
R2 adj.	0.03	0.07	0.21	0.21	0.01	0.06	0.21	0.21	0.03	0.07	0.21	0.22
N	432	432	432	432	432	432	432	432	432	432	432	432
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes
Dependent variable: Value added growth												
	1	2	3	4	5	6	7	8	9	10	11	12
shM	-0.11	0.00	0.17	0.13	0.19 ***	0.22 **	0.33 ***	0.30 **				
	'(0.30)	'(0.98)	'(0.28)	'(0.40)	'(0.00)	'(0.02)	'(0.01)	'(0.01)				
shM3	0.29 ***	0.23 **	0.17	0.18 *					0.22 ***	0.24 ***	0.24 ***	0.23 ***
	'(0.00)	'(0.01)	'(0.10)	'(0.10)					'(0.00)	'(0.00)	'(0.00)	'(0.00)
stM3	0.04 **	0.02	0.03	0.03	0.05 ***	0.03 *	0.05 **	0.05 **	0.04 ***	0.02	0.02	0.02
	'(0.02)	'(0.25)	'(0.23)	'(0.25)	'(0.00)	'(0.08)	'(0.03)	'(0.03)	'(0.01)	'(0.24)	'(0.38)	'(0.35)
F	10.17	4.73	4.04	3.44	8.83	4.52	4.09	3.46	14.71	5.13	4.19	3.56
R2	0.07	0.13	0.16	0.17	0.04	0.12	0.16	0.16	0.06	0.13	0.16	0.17
R2 adj.	0.06	0.10	0.12	0.12	0.04	0.09	0.12	0.12	0.06	0.10	0.12	0.12
N	432	432	432	432	432	432	432	432	432	432	432	432
Country dummies	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Industry dummies	No	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Year dummies	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

### 3.1.5 Labour market characteristics and migration policies

Finally we also include other variables which might affect the productivity of migrant workers. These additional variables are subindices from an index called MIPEX (see <http://www.integrationindex.eu/>, for details). As these indices are however not available over time and thus we restrict the analysis to the cross-section estimations. First, however, we report the values of both indices in Table 22. The MIPEX index is evaluated using various sources considering the legal situation of migrants in the various countries. For this study we use the indexes on labour market access (MIPEX1) and antidiscrimination of migrant workers (MIPEX6). These indices range from 0 to 100 where 100 would mean good access to labour markets or high level of antidiscrimination measures. The EPL index measures labour market restrictions; a higher value implies high restrictions. The respective values are presented in Table 22. As one can see with respect to both MIPEX indices Sweden, for example, shows rather high values (100 and 94) whereas Austria is ranked very low with 45 and 42 only. With respect to the EPL index the values range from 1.1 in the UK to 3.5 in Portugal.

Table 22

	MIPEX	
	Labour market access	Antidiscrimination
AT	45	42
BE	75	75
DK	40	33
ES	90	50
FI	70	75
FR	50	81
IE	50	58
NL	70	81
PT	90	87
SE	100	94
UK	60	81

Source: <http://www.integrationindex.eu/>

Including these indices into the cross-section regressions might have an additional effect on industry performance. In the results reported above we scaled the indices by dividing them by 100. Tables 23 to 3.27 report the results when including these indices in the cross-section regressions reported above.



Table 23

## Cross-section results

## Dependent variable: Total factor productivity growth

	1	3	5	7	9	11
shM	0.04 '(0.35)	0.08 '(0.10)	0.02 '(0.66)	0.05 '(0.21)		
shM3	-0.02 '(0.31)	-0.03 '(0.29)			-0.01 '(0.56)	-0.00 '(0.87)
stM3	-0.01 '(0.42)	-0.01 '(0.49)	-0.01 '(0.26)	-0.01 '(0.21)	-0.01 '(0.29)	-0.02 '(0.20)
MIPEX1	-0.01 '(0.46)	-0.01 '(0.54)	-0.01 '(0.38)	-0.01 '(0.44)	-0.01 '(0.38)	-0.01 '(0.39)
MIPEX6	0.02 * '(0.08)	0.02 '(0.10)	0.02 * '(0.08)	0.02 '(0.11)	0.02 * '(0.07)	0.02 * '(0.09)
Constant	-0.00 '(0.95)	0.04 ** '(0.03)	0.00 '(0.93)	0.04 ** '(0.01)	0.00 '(0.75)	0.05 *** '(0.00)
F	1.24	2.68	1.29	2.72	1.32	2.66
R2	0.02	0.24	0.02	0.24	0.02	0.24
R2 adj.	0.00	0.15	0.00	0.15	0.00	0.15
N	327	327	327	327	327	327
Industry dummies	No	Yes	No	Yes	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

## Dependent variable: Labour productivity growth

	1	3	5	7	9	11
shM	-0.04 '(0.37)	0.03 '(0.41)	-0.01 '(0.84)	0.07 * '(0.07)		
shM3	0.03 '(0.24)	0.04 '(0.13)			0.01 '(0.44)	0.05 ** '(0.03)
stM3	0.00 '(0.84)	0.00 '(0.73)	0.01 '(0.63)	0.01 '(0.35)	0.00 '(0.73)	0.00 '(0.84)
MIPEX1	-0.01 '(0.36)	-0.01 '(0.33)	-0.01 '(0.46)	-0.01 '(0.44)	-0.01 '(0.42)	-0.01 '(0.28)
MIPEX6	0.03 * '(0.06)	0.02 * '(0.06)	0.03 * '(0.06)	0.02 ** '(0.05)	0.02 * '(0.07)	0.02 * '(0.05)
Constant	0.01 '(0.22)	0.01 '(0.38)	0.01 '(0.30)	0.01 '(0.47)	0.01 '(0.32)	0.02 '(0.27)
F	1.05	3.48	0.98	3.50	1.11	3.57
R2	0.02	0.29	0.01	0.29	0.01	0.29
R2 adj.	0.00	0.21	0.00	0.21	0.00	0.21
N	332	332	332	332	332	332
Industry dummies	No	Yes	No	Yes	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

## Dependent variable: Value added growth

	1	3	5	7	9	11
shM	-0.04 '(0.44)	-0.06 '(0.27)	0.03 '(0.31)	0.03 '(0.43)		
shM3	0.05 * '(0.06)	0.07 ** '(0.02)			0.04 ** '(0.05)	0.05 ** '(0.03)
stM3	0.02 ** '(0.01)	0.01 '(0.44)	0.03 *** '(0.00)	0.02 ** '(0.03)	0.03 *** '(0.00)	0.02 '(0.16)
MIPEX1	0.02 '(0.17)	0.02 '(0.12)	0.02 '(0.11)	0.02 * '(0.06)	0.02 '(0.15)	0.02 * '(0.10)
MIPEX6	-0.00 '(0.91)	-0.01 '(0.68)	-0.00 '(0.89)	-0.01 '(0.70)	-0.00 '(0.90)	-0.01 '(0.70)
Constant	-0.00 '(0.69)	-0.01 '(0.73)	-0.01 '(0.41)	-0.01 '(0.45)	-0.01 '(0.46)	-0.01 '(0.51)
F	3.89	3.30	3.92	3.19	4.71	3.36
R2	0.06	0.28	0.05	0.27	0.05	0.28
R2 adj.	0.04	0.20	0.03	0.18	0.04	0.19
N	333.00	333.00	333.00	333.00	333.00	333.00
Industry dummies	No	Yes	No	Yes	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Table 24

### Cross-section results including only manufacturing industries

**Dependent variable: Total factor productivity growth**

	1	3	5	7	9	11
shM	0.09 '(0.26)	0.05 '(0.53)	0.11 * '(0.08)	0.10 '(0.14)		
shM3	0.02 '(0.65)	0.04 '(0.38)			0.05 '(0.16)	0.06 '(0.11)
stM3	0.02 '(0.26)	0.01 '(0.79)	0.03 '(0.12)	0.02 '(0.36)	0.01 '(0.44)	0.00 '(0.99)
MIPEX1	-0.01 '(0.58)	-0.01 '(0.60)	-0.01 '(0.60)	-0.01 '(0.63)	-0.01 '(0.57)	-0.01 '(0.60)
MIPEX6	0.06 ** '(0.01)	0.05 ** '(0.02)	0.06 ** '(0.01)	0.05 ** '(0.02)	0.06 ** '(0.01)	0.05 ** '(0.03)
Constant	-0.03 * '(0.07)	-0.03 '(0.12)	-0.03 * '(0.06)	-0.04 * '(0.07)	-0.02 '(0.14)	-0.03 '(0.15)
F	2.25	1.20	2.78	1.23	2.49	1.26
R2	0.08	0.15	0.08	0.14	0.07	0.14
R2 adj.	0.04	0.02	0.05	0.03	0.04	0.03
N	139	139	139	139	139	139
Industry dummies	No	Yes	No	Yes	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

**Dependent variable: Labour productivity growth**

	1	3	5	7	9	11
shM	0.11 '(0.16)	0.07 '(0.40)	0.08 '(0.24)	0.05 '(0.47)		
shM3	-0.03 '(0.37)	-0.02 '(0.63)			-0.01 '(0.67)	-0.01 '(0.85)
stM3	0.03 '(0.18)	0.01 '(0.70)	0.02 '(0.26)	0.00 '(0.85)	0.02 '(0.33)	0.00 '(0.95)
MIPEX1	-0.00 '(0.95)	-0.00 '(0.91)	-0.00 '(0.89)	-0.00 '(0.87)	-0.01 '(0.81)	-0.01 '(0.82)
MIPEX6	0.05 ** '(0.04)	0.05 ** '(0.05)	0.05 ** '(0.04)	0.05 ** '(0.05)	0.05 ** '(0.03)	0.05 ** '(0.04)
Constant	-0.01 '(0.49)	-0.02 '(0.47)	-0.01 '(0.55)	-0.01 '(0.51)	-0.00 '(0.94)	-0.01 '(0.67)
F	1.68	1.22	1.90	1.29	1.58	1.25
R2	0.06	0.15	0.05	0.15	0.05	0.14
R2 adj.	0.02	0.03	0.03	0.03	0.02	0.03
N	138	138	138	138	138	138
Industry dummies	No	Yes	No	Yes	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

**Dependent variable: Value added growth**

	1	3	5	7	9	11
shM	-0.07 '(0.41)	-0.10 '(0.28)	-0.03 '(0.62)	-0.00 '(0.98)		
shM3	0.04 '(0.48)	0.11 * '(0.08)			0.01 '(0.81)	0.07 '(0.16)
stM3	0.07 *** '(0.00)	0.04 '(0.21)	0.08 *** '(0.00)	0.07 *** '(0.01)	0.08 *** '(0.00)	0.05 * '(0.05)
MIPEX1	0.03 '(0.21)	0.03 '(0.20)	0.03 '(0.17)	0.04 '(0.11)	0.03 '(0.17)	0.03 '(0.17)
MIPEX6	0.03 '(0.22)	0.03 '(0.28)	0.03 '(0.22)	0.03 '(0.29)	0.03 '(0.21)	0.03 '(0.25)
Constant	-0.04 ** '(0.02)	-0.02 '(0.58)	-0.05 *** '(0.01)	-0.02 '(0.42)	-0.05 *** '(0.00)	-0.03 '(0.25)
F	4.64	2.98	5.70	2.92	5.65	3.10
R2	0.15	0.30	0.15	0.29	0.15	0.30
R2 adj.	0.12	0.20	0.12	0.19	0.12	0.20
N	134.00	134.00	134.00	134.00	134.00	134.00
Industry dummies	No	Yes	No	Yes	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Table 25

### Cross-section results including only service industries

Dependent variable: Total factor productivity growth						
	1	3	5	7	9	11
shM	-0.04 '(0.64)	0.14 '(0.10)	-0.02 '(0.81)	0.08 '(0.17)		
shM3	0.03 '(0.67)	-0.06 '(0.34)			0.01 '(0.89)	0.01 '(0.79)
stM3	0.04 ** '(0.04)	0.02 '(0.26)	0.04 ** '(0.04)	0.02 '(0.36)	0.05 ** '(0.02)	0.01 '(0.57)
MIPEX1	-0.02 '(0.38)	-0.02 '(0.39)	-0.02 '(0.39)	-0.02 '(0.36)	-0.02 '(0.40)	-0.02 '(0.31)
MIPEX6	0.01 '(0.64)	0.01 '(0.65)	0.01 '(0.62)	0.01 '(0.74)	0.01 '(0.63)	0.01 ** '(0.73)
Constant	-0.00 '(0.83)	-0.02 '(0.28)	-0.00 '(0.82)	-0.02 '(0.37)	-0.01 '(0.68)	-0.01 '(0.77)
F	1.36	5.38	1.68	5.88	1.67	5.50
R2	0.10	0.50	0.10	0.49	0.10	0.47
R2 adj.	0.03	0.40	0.04	0.40	0.04	0.38
N	66	66	66	66	66	66
Industry dummies	No	Yes	No	Yes	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Dependent variable: Labour productivity growth						
	1	3	5	7	9	11
shM	-0.10 '(0.40)	0.08 '(0.39)	-0.14 * '(0.06)	0.05 '(0.42)		
shM3	-0.04 '(0.63)	-0.03 '(0.66)			-0.08 * '(0.08)	0.01 '(0.75)
stM3	0.00 '(0.92)	-0.04 '(0.16)	0.00 '(0.89)	-0.05 * '(0.10)	0.01 '(0.80)	-0.05 * '(0.07)
MIPEX1	-0.02 '(0.62)	-0.01 '(0.81)	-0.02 '(0.56)	-0.01 '(0.76)	-0.01 '(0.69)	-0.01 '(0.73)
MIPEX6	0.02 '(0.57)	0.00 '(0.84)	0.02 '(0.50)	0.01 '(0.81)	0.01 '(0.63)	0.01 '(0.78)
Constant	0.03 '(0.21)	0.02 '(0.35)	0.03 '(0.22)	0.02 '(0.28)	0.03 '(0.28)	0.03 '(0.15)
F	0.98	7.62	1.18	8.56	1.05	8.42
R2	0.08	0.58	0.07	0.58	0.06	0.58
R2 adj.	-0.00	0.50	0.01	0.51	0.00	0.51
N	66	66	66	66	66	66
Industry dummies	No	Yes	No	Yes	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Dependent variable: Value added growth						
	1	3	5	7	9	11
shM	-0.02 '(0.84)	0.10 '(0.23)	-0.08 '(0.17)	0.04 '(0.56)		
shM3	-0.05 '(0.34)	-0.07 '(0.25)			-0.06 * '(0.09)	-0.02 '(0.62)
stM3	0.07 *** '(0.00)	0.06 *** '(0.00)	0.07 *** '(0.00)	0.05 *** '(0.00)	0.07 *** '(0.00)	0.06 *** '(0.00)
MIPEX1	-0.01 '(0.69)	-0.00 '(0.85)	-0.01 '(0.60)	-0.01 '(0.75)	-0.01 '(0.71)	-0.01 '(0.69)
MIPEX6	-0.01 '(0.61)	-0.02 '(0.40)	-0.01 '(0.56)	-0.02 '(0.32)	-0.01 '(0.60)	-0.02 '(0.43)
Constant	0.03 * '(0.05)	0.01 '(0.45)	0.03 ** '(0.03)	0.02 '(0.24)	0.03 ** '(0.04)	0.02 '(0.14)
F	4.23	5.25	5.06	5.64	5.36	5.62
R2	0.26	0.49	0.25	0.48	0.26	0.48
R2 adj.	0.20	0.40	0.20	0.39	0.21	0.39
N	66	66	66	66	66	66
Industry dummies	No	Yes	No	Yes	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Table 26

### Cross-section results including only low educational intensive industries

Dependent variable: Total factor productivity growth						
	1	3	5	7	9	11
shM	-0.03 '(0.57)	-0.00 '(0.96)	-0.06 '(0.13)	-0.02 '(0.64)		
shM3	-0.03 '(0.41)	-0.02 '(0.54)			-0.04 '(0.10)	-0.02 '(0.44)
stM3	0.02 '(0.24)	0.02 '(0.23)	0.01 '(0.36)	0.02 '(0.29)	0.02 '(0.13)	0.02 '(0.18)
MIPEX1	-0.03 ** '(0.04)	-0.03 ** '(0.03)	-0.04 ** '(0.03)	-0.04 ** '(0.02)	-0.03 * '(0.05)	-0.03 ** '(0.03)
MIPEX6	0.03 ** '(0.04)	0.03 ** '(0.04)	0.03 ** '(0.05)	0.03 ** '(0.04)	0.03 ** '(0.04)	0.03 ** '(0.04)
Constant	0.01 '(0.51)	-0.01 '(0.57)	0.01 '(0.37)	-0.01 '(0.60)	0.01 '(0.65)	-0.01 '(0.48)
F	2.13	2.04	2.50	2.19	2.60	2.23
R2	0.10	0.24	0.10	0.24	0.10	0.24
R2 adj.	0.06	0.12	0.06	0.13	0.06	0.13
N	98	98	98	98	98	98
Industry dummies	No	Yes	No	Yes	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Dependent variable: Labour productivity growth						
	1	3	5	7	9	11
shM	0.03 '(0.61)	0.04 '(0.48)	-0.05 '(0.24)	0.01 '(0.80)		
shM3	-0.07 ** '(0.04)	-0.03 '(0.38)			-0.06 ** '(0.02)	-0.02 '(0.57)
stM3	0.03 '(0.17)	0.04 * '(0.06)	0.01 '(0.50)	0.03 * '(0.09)	0.02 '(0.20)	0.03 * '(0.08)
MIPEX1	-0.03 * '(0.08)	-0.03 ** '(0.03)	-0.04 ** '(0.03)	-0.04 ** '(0.01)	-0.03 * '(0.06)	-0.04 ** '(0.02)
MIPEX6	0.04 ** '(0.01)	0.04 *** '(0.00)	0.04 ** '(0.01)	0.04 *** '(0.00)	0.04 ** '(0.01)	0.04 *** '(0.00)
Constant	0.01 '(0.48)	0.01 '(0.49)	0.01 '(0.25)	0.01 '(0.37)	0.01 '(0.30)	0.01 '(0.28)
F	2.75	3.41	2.32	3.64	3.40	3.67
R2	0.13	0.35	0.09	0.35	0.13	0.35
R2 adj.	0.09	0.25	0.05	0.25	0.09	0.25
N	95	95	95	95	95	95
Industry dummies	No	Yes	No	Yes	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Dependent variable: Value added growth						
	1	3	5	7	9	11
shM	-0.09 '(0.19)	-0.03 '(0.66)	-0.08 * '(0.08)	-0.06 '(0.20)		
shM3	0.01 '(0.80)	-0.04 '(0.38)			-0.04 '(0.23)	-0.05 '(0.13)
stM3	-0.04 '(0.21)	0.00 '(0.95)	-0.03 '(0.19)	-0.01 '(0.66)	-0.02 '(0.43)	0.01 *** '(0.77)
MIPEX1	0.00 '(0.86)	0.01 '(0.58)	0.01 '(0.79)	0.01 '(0.76)	0.01 '(0.57)	0.01 '(0.48)
MIPEX6	0.00 '(0.93)	0.01 '(0.75)	0.00 '(0.91)	0.00 '(0.85)	0.00 '(0.86)	0.01 '(0.72)
Constant	0.01 '(0.43)	0.01 '(0.47)	0.01 '(0.45)	0.01 '(0.43)	0.00 '(0.91)	0.01 '(0.57)
F	1.05	4.47	1.31	4.79	0.87	4.87
R2	0.05	0.41	0.05	0.40	0.04	0.41
R2 adj.	0.00	0.32	0.01	0.32	-0.01	0.32
N	98	98	98	98	98	98
Industry dummies	No	Yes	No	Yes	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Table 27

### Cross-section results including only high educational intensive industries

Dependent variable: Total factor productivity growth						
	1	3	5	7	9	11
shM	-0.19 '(0.34)	-0.03 '(0.88)	0.14 '(0.25)	0.20 '(0.11)		
shM3	0.31 ** '(0.04)	0.21 '(0.17)			0.20 ** '(0.03)	0.19 ** '(0.04)
stM3	-0.01 '(0.60)	0.04 '(0.29)	-0.00 '(0.96)	0.07 * '(0.09)	-0.01 '(0.80)	0.05 '(0.23)
MIPEX1	0.04 '(0.26)	0.03 '(0.26)	0.03 '(0.37)	0.03 '(0.33)	0.04 '(0.26)	0.03 '(0.25)
MIPEX6	0.01 '(0.83)	0.01 '(0.73)	0.01 '(0.84)	0.01 '(0.71)	0.00 '(0.93)	0.01 '(0.74)
Constant	-0.03 '(0.22)	-0.06 ** '(0.03)	-0.03 '(0.24)	-0.07 ** '(0.01)	-0.04 '(0.14)	-0.06 ** '(0.02)
F	1.55	2.45	0.82	2.47	1.71	2.70
R2	0.09	0.28	0.04	0.27	0.08	0.28
R2 adj.	0.03	0.17	-0.01	0.16	0.03	0.18
N	87	87	87	87	87	87
Industry dummies	No	Yes	No	Yes	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Dependent variable: Labour productivity growth						
	1	3	5	7	9	11
shM	-0.21 '(0.37)	0.03 '(0.90)	0.15 '(0.23)	0.22 * '(0.09)		
shM3	0.34 * '(0.07)	0.16 '(0.39)			0.20 ** '(0.05)	0.18 * '(0.05)
stM3	-0.04 '(0.13)	0.01 '(0.65)	-0.03 '(0.31)	0.03 '(0.30)	-0.03 '(0.18)	0.01 '(0.65)
MIPEX1	0.05 '(0.16)	0.04 '(0.17)	0.05 '(0.18)	0.04 '(0.18)	0.05 '(0.15)	0.04 '(0.17)
MIPEX6	0.00 '(0.92)	0.01 '(0.86)	0.00 '(0.92)	0.01 '(0.87)	-0.00 '(0.97)	0.01 '(0.85)
Constant	-0.01 '(0.64)	-0.05 ** '(0.05)	-0.02 '(0.53)	-0.05 ** '(0.03)	-0.02 '(0.48)	-0.05 ** '(0.04)
F	1.91	3.88	1.47	4.17	2.18	4.28
R2	0.10	0.38	0.07	0.38	0.10	0.38
R2 adj.	0.05	0.28	0.02	0.29	0.05	0.29
N	88	88	88	88	88	88
Industry dummies	No	Yes	No	Yes	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Dependent variable: Value added growth						
	1	3	5	7	9	11
shM	-0.34 * '(0.06)	-0.33 '(0.11)	0.25 ** '(0.02)	0.27 ** '(0.03)		
shM3	0.52 *** '(0.00)	0.50 *** '(0.00)			0.31 *** '(0.00)	0.30 *** '(0.00)
stM3	0.03 '(0.16)	0.05 '(0.16)	0.06 ** '(0.02)	0.09 *** '(0.00)	0.05 ** '(0.03)	0.07 ** '(0.03)
MIPEX1	0.04 '(0.15)	0.04 '(0.18)	0.04 '(0.18)	0.03 '(0.22)	0.04 '(0.12)	0.04 '(0.14)
MIPEX6	-0.01 '(0.78)	-0.01 '(0.85)	-0.02 '(0.57)	-0.01 '(0.69)	-0.02 '(0.52)	-0.01 '(0.61)
Constant	-0.03 '(0.14)	-0.04 * '(0.09)	-0.04 '(0.11)	-0.05 * '(0.07)	-0.04 ** '(0.04)	-0.05 ** '(0.03)
F	5.77	2.91	2.78	1.86	6.08	2.88
R2	0.26	0.32	0.12	0.21	0.23	0.29
R2 adj.	0.22	0.21	0.08	0.10	0.19	0.19
N	88	88	88	88	88	88
Industry dummies	No	Yes	No	Yes	No	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

The results indicate that in countries with better antidiscrimination measures (MIPEX6) tend to have higher productivity growth rates (Table 23). This is the case for both growth in total factor productivity and labour productivity. The other variable (MIPEX1) capturing labour market access for migrant workers is less often significant and sometimes even negative. These variables are however not significant with respect to value added growth.

With respect to different industry categories these results hold of manufacturing industries (Table 24) but not for service industries (Table 25). Similarly, the results hold for low educational intensive industries (Table 26) but again not for high educational intensive industries (Table 27).

## Appendix B – Additional results

Table B.1

### Cross-section results by country

Dependent variable: Total factor productivity growth

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
shM	-0.12 '(0.23)	-0.12 '(0.20)	-0.26 ** '(0.02)	-0.03 '(0.88)	0.03 '(0.98)	-0.14 '(0.31)	0.00 '(1.00)	0.05 '(0.78)	0.00 '(0.98)	0.07 '(0.85)	0.26 '(0.38)
shM3	0.03 '(0.64)	-0.05 '(0.44)	0.05 '(0.22)	-0.20 * '(0.09)	1.27 '(0.45)	0.03 '(0.60)	0.14 '(0.58)	0.05 '(0.67)	-0.03 '(0.52)	0.05 '(0.73)	-0.15 '(0.37)
stM3	0.00 '(0.97)	0.00 '(0.97)	-0.04 * '(0.08)	0.00 '(0.99)	-0.01 '(0.77)	-0.02 '(0.53)	-0.01 '(0.87)	0.03 '(0.40)	0.00 '(0.96)	0.11 '(0.18)	-0.07 *** '(0.01)
Constant	0.02 * '(0.09)	0.02 '(0.11)	0.02 *** '(0.00)	0.01 '(0.51)	0.01 '(0.53)	0.02 '(0.13)	-0.01 '(0.66)	-0.01 '(0.75)	-0.01 '(0.28)	-0.01 '(0.80)	0.04 *** '(0.01)
F	0.70	1.71	3.18	1.75	0.24	0.42	0.20	0.55	0.15	1.79	3.83
R2	0.07	0.16	0.28	0.17	0.04	0.04	0.02	0.06	0.02	0.17	0.31
R2 adj.	-0.03	0.07	0.20	0.07	-0.12	-0.06	-0.09	-0.05	-0.10	0.08	0.23
N	31	30	28	29	23	31	29	30	29	30	30

Dependent variable: Labour productivity growth

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
shM	-0.17 '(0.14)	-0.10 '(0.35)	-0.05 '(0.70)	-0.69 *** '(0.00)	0.18 '(0.88)	-0.14 '(0.30)	0.38 '(0.49)	-0.02 '(0.91)	-0.05 '(0.84)	0.05 '(0.88)	-0.06 '(0.86)
shM3	0.07 '(0.26)	0.01 '(0.93)	0.04 '(0.38)	0.15 * '(0.06)	0.52 '(0.76)	0.02 '(0.81)	0.13 '(0.62)	0.00 '(0.97)	-0.12 * '(0.09)	0.09 '(0.55)	-0.18 '(0.38)
stM3	-0.01 '(0.74)	-0.01 '(0.85)	-0.05 ** '(0.03)	-0.01 '(0.60)	0.00 '(0.97)	-0.03 '(0.35)	-0.03 '(0.64)	-0.01 '(0.81)	0.00 '(0.93)	0.12 '(0.17)	-0.06 ** '(0.04)
Constant	0.03 ** '(0.02)	0.03 ** '(0.02)	0.03 *** '(0.00)	0.03 *** '(0.00)	0.02 '(0.19)	0.04 ** '(0.01)	0.00 '(0.89)	0.03 '(0.17)	0.03 '(0.11)	0.00 '(0.96)	0.07 *** '(0.00)
F	0.84	1.05	1.73	5.90	0.06	0.64	0.80	0.05	1.07	2.49	4.01
R2	0.09	0.10	0.17	0.41	0.01	0.07	0.09	0.01	0.11	0.22	0.31
R2 adj.	-0.02	0.01	0.07	0.34	-0.15	-0.04	-0.02	-0.11	0.01	0.13	0.23
N	31	31	29	30	23	31	30	31	29	31	31

Dependent variable: Value added growth

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
shM	-0.08 '(0.46)	0.10 '(0.37)	0.17 '(0.29)	0.36 '(0.15)	3.76 *** '(0.00)	-0.11 '(0.42)	0.89 * '(0.06)	-0.20 '(0.17)	0.05 '(0.78)	-0.18 '(0.55)	-0.48 '(0.20)
shM3	0.02 '(0.72)	-0.10 '(0.16)	-0.20 *** '(0.00)	-0.16 '(0.11)	-0.12 '(0.94)	0.04 '(0.48)	-0.43 ** '(0.05)	0.00 '(0.96)	-0.07 '(0.16)	0.16 '(0.25)	0.41 * '(0.07)
stM3	0.03 '(0.44)	0.03 '(0.19)	0.04 '(0.14)	0.02 '(0.48)	0.04 '(0.16)	0.04 '(0.26)	0.00 '(0.96)	0.02 '(0.54)	0.05 '(0.11)	0.15 * '(0.05)	-0.01 '(0.79)
Constant	0.02 '(0.22)	0.00 '(0.87)	0.00 '(0.98)	0.01 '(0.38)	-0.01 '(0.39)	0.01 '(0.47)	0.03 '(0.14)	0.03 '(0.14)	0.00 '(0.68)	0.00 '(0.88)	0.00 '(0.89)
F	0.75	0.94	4.31	1.01	3.68	0.93	1.86	1.34	1.43	5.11	1.34
R2	0.08	0.09	0.34	0.10	0.37	0.09	0.18	0.13	0.15	0.36	0.13
R2 adj.	-0.03	-0.01	0.26	0.00	0.27	-0.01	0.08	0.03	0.04	0.29	0.03
N	31	31	29	30	23	31	30	31	29	31	31

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Table B.2

## Cross-section results by country

## Dependent variable: Total factor productivity growth

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
shM	-0.09 '(0.20)	-0.17 ** '(0.04)	-0.22 ** '(0.04)	-0.21 '(0.18)	0.20 '(0.86)	-0.09 '(0.36)	0.20 '(0.61)	0.08 '(0.59)	0.00 '(0.98)	0.14 '(0.56)	0.05 '(0.79)
stM3	0.01 '(0.82)	-0.01 '(0.57)	-0.02 '(0.20)	0.00 '(0.85)	0.01 '(0.74)	-0.02 '(0.58)	-0.01 '(0.78)	0.04 '(0.23)	0.00 '(0.92)	0.13 ** '(0.05)	-0.07 *** '(0.00)
Constant	0.02 * '(0.09)	0.02 * '(0.07)	0.02 *** '(0.01)	0.01 '(0.63)	0.01 '(0.52)	0.02 '(0.14)	-0.01 '(0.77)	-0.01 '(0.75)	-0.01 '(0.16)	-0.01 '(0.68)	0.04 *** '(0.01)
F	0.96	2.29	3.90	0.96	0.06	0.50	0.14	0.75	0.01	2.71	5.37
R2	0.06	0.15	0.24	0.07	0.01	0.03	0.01	0.05	0.00	0.17	0.28
R2 adj.	0.00	0.08	0.18	0.00	-0.09	-0.04	-0.07	-0.02	-0.08	0.11	0.23
N	31	30	28	29	23	31	29	30	29	30	30

## Dependent variable: Labour productivity growth

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
shM	-0.08 '(0.32)	-0.09 * '(0.08)	-0.01 '(0.96)	-0.40 *** '(0.00)	0.25 '(0.82)	-0.12 '(0.24)	0.57 '(0.15)	-0.02 '(0.87)	-0.05 '(0.83)	0.19 '(0.44)	-0.31 * '(0.05)
stM3	0.01 '(0.80)	0.00 '(0.86)	-0.04 ** '(0.05)	-0.01 '(0.80)	0.00 '(0.80)	-0.03 '(0.36)	-0.03 '(0.55)	-0.01 '(0.71)	-0.01 '(0.77)	0.15 ** '(0.03)	-0.07 ** '(0.02)
Constant	0.03 ** '(0.04)	0.03 *** '(0.00)	0.03 *** '(0.00)	0.03 ** '(0.01)	0.02 '(0.18)	0.04 ** '(0.01)	0.00 '(1.00)	0.03 '(0.15)	0.02 '(0.30)	-0.01 '(0.85)	0.07 *** '(0.00)
F	0.60	1.62	2.21	6.34	0.04	0.97	1.11	0.08	0.08	3.63	5.65
R2	0.04	0.10	0.15	0.32	0.00	0.07	0.08	0.01	0.01	0.21	0.29
R2 adj.	-0.03	0.04	0.08	0.27	-0.10	0.00	0.01	-0.07	-0.07	0.15	0.24
N	31	31	29	30	23	31	30	31	29	31	31

## Dependent variable: Value added growth

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
shM	-0.05 '(0.46)	-0.04 '(0.52)	-0.04 '(0.80)	0.04 '(0.80)	3.75 *** '(0.00)	-0.05 '(0.64)	0.24 '(0.49)	-0.19 '(0.11)	0.05 '(0.79)	0.05 '(0.80)	0.12 '(0.53)
stM3	0.04 '(0.27)	0.01 '(0.61)	-0.01 '(0.79)	0.01 '(0.64)	0.04 * '(0.06)	0.04 '(0.20)	0.02 '(0.71)	0.02 '(0.36)	0.04 '(0.19)	0.20 *** '(0.00)	0.01 '(0.86)
Constant	0.01 '(0.23)	0.01 '(0.40)	0.01 '(0.62)	0.02 '(0.20)	-0.01 '(0.38)	0.01 '(0.57)	0.02 '(0.37)	0.03 '(0.12)	0.00 '(0.92)	-0.01 '(0.76)	0.00 '(0.95)
F	1.10	0.35	0.07	0.12	5.81	1.15	0.57	2.08	1.02	6.86	0.23
R2	0.07	0.02	0.01	0.01	0.37	0.08	0.04	0.13	0.07	0.33	0.02
R2 adj.	0.01	-0.05	-0.07	-0.07	0.30	0.01	-0.03	0.07	0.00	0.28	-0.05
N	31	31	29	30	23	31	30	31	29	31	31

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.



Table B.3

## Cross-section results by country

## Dependent variable: Total factor productivity growth

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
shM3	-0.02 '(0.54)	-0.09 * '(0.08)	0.02 '(0.67)	-0.21 ** '(0.03)	1.28 '(0.42)	-0.01 '(0.84)	0.14 '(0.44)	0.06 '(0.53)	-0.03 '(0.51)	0.07 '(0.51)	-0.03 '(0.75)
stM3	0.02 '(0.55)	0.01 '(0.44)	-0.03 '(0.14)	0.00 '(0.95)	-0.01 '(0.74)	-0.01 '(0.71)	-0.01 '(0.85)	0.03 '(0.41)	0.00 '(0.96)	0.11 '(0.17)	-0.07 *** '(0.01)
Constant	0.01 '(0.21)	0.01 '(0.31)	0.01 * '(0.07)	0.01 '(0.49)	0.01 '(0.32)	0.01 '(0.23)	-0.01 '(0.64)	-0.00 '(0.88)	-0.01 * '(0.08)	-0.00 '(0.87)	0.04 *** '(0.00)
F	0.30	1.66	1.33	2.72	0.38	0.09	0.31	0.81	0.23	2.77	5.38
R2	0.02	0.11	0.10	0.17	0.04	0.01	0.02	0.06	0.02	0.17	0.29
R2 adj.	-0.05	0.04	0.02	0.11	-0.06	-0.06	-0.05	-0.01	-0.06	0.11	0.23
N	31	30	28	29	23	31	29	30	29	30	30

## Dependent variable: Labour productivity growth

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
shM3	0.00 '(0.98)	-0.05 '(0.15)	0.04 '(0.41)	-0.08 '(0.15)	0.57 '(0.72)	-0.03 '(0.56)	0.25 '(0.17)	-0.01 '(0.90)	-0.12 * '(0.09)	0.11 '(0.33)	-0.21 ** '(0.03)
stM3	0.02 '(0.68)	0.01 '(0.68)	-0.05 ** '(0.03)	0.01 '(0.66)	-0.00 '(0.92)	-0.02 '(0.49)	-0.01 '(0.88)	-0.01 '(0.83)	0.00 '(0.95)	0.11 '(0.16)	-0.06 ** '(0.03)
Constant	0.02 * '(0.08)	0.02 ** '(0.01)	0.03 *** '(0.00)	0.01 '(0.32)	0.02 ** '(0.04)	0.03 *** '(0.01)	0.00 '(0.94)	0.02 ** '(0.01)	0.02 ** '(0.02)	0.01 '(0.77)	0.06 *** '(0.00)
F	0.10	1.11	2.61	1.36	0.08	0.42	0.98	0.07	1.65	3.86	6.21
R2	0.01	0.07	0.17	0.09	0.01	0.03	0.07	0.01	0.11	0.22	0.31
R2 adj.	-0.06	0.01	0.10	0.02	-0.09	-0.04	-0.00	-0.07	0.04	0.16	0.26
N	31	31	29	30	23	31	30	31	29	31	31

## Dependent variable: Value added growth

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
shM3	-0.01 '(0.77)	-0.05 '(0.20)	-0.18 *** '(0.00)	-0.04 '(0.46)	0.95 '(0.65)	0.01 '(0.82)	-0.14 '(0.37)	-0.05 '(0.41)	-0.07 '(0.15)	0.10 '(0.30)	0.16 '(0.15)
stM3	0.04 '(0.20)	0.02 '(0.33)	0.03 '(0.19)	0.01 '(0.77)	0.01 '(0.83)	0.04 '(0.16)	0.04 '(0.33)	0.04 '(0.17)	0.05 * '(0.09)	0.16 ** '(0.03)	-0.00 '(0.96)
Constant	0.01 '(0.31)	0.01 '(0.37)	0.01 '(0.35)	0.02 ** '(0.04)	0.02 * '(0.08)	0.00 '(0.88)	0.05 ** '(0.05)	0.01 '(0.56)	0.01 '(0.29)	-0.01 '(0.60)	-0.01 '(0.67)
F	0.86	0.99	5.84	0.37	0.37	1.06	0.76	0.99	2.18	7.65	1.10
R2	0.06	0.07	0.31	0.03	0.04	0.07	0.05	0.07	0.14	0.35	0.07
R2 adj.	-0.01	-0.00	0.26	-0.05	-0.06	0.00	-0.02	-0.00	0.08	0.31	0.01
N	31	31	29	30	23	31	30	31	29	31	31

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Table B.4

## Panel regression results 1

## Dependent variable: Total factor productivity growth

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
shM3	0.29 *** '(0.00)	0.09 '(0.46)	0.03 '(0.77)	-0.16 '(0.14)	-0.48 '(0.18)	-0.02 '(0.92)	0.01 '(0.98)	0.05 '(0.54)	-0.03 '(0.25)	-0.04 '(0.76)	0.40 ** '(0.03)
stM3	-0.14 ** '(0.01)	0.00 '(0.92)	0.00 '(0.95)	-0.02 '(0.71)	0.07 * '(0.09)	0.00 '(0.97)	0.27 '(0.12)	0.05 '(0.23)	-0.05 '(0.13)	-0.11 '(0.17)	-0.10 ** '(0.04)
Constant	0.05 '(0.21)	-0.02 '(0.49)	0.03 '(0.45)	0.00 '(0.97)	0.60 *** '(0.00)	0.01 '(0.80)	-0.24 * '(0.08)	-0.04 '(0.32)	0.02 '(0.41)	0.08 '(0.15)	0.01 '(0.85)
F	1.45	0.82	0.62	1.24	4.40	0.76	0.76	2.24	1.40	3.29	2.09
R2	0.28	0.18	0.15	0.25	0.56	0.17	0.17	0.37	0.27	0.54	0.36
R2 adj.	0.09	-0.04	-0.09	0.05	0.43	-0.05	-0.05	0.21	0.08	0.37	0.19
N	154	149	137	149	145	155	149	150	150	120	150

## Dependent variable: Labour productivity growth

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
shM3	0.25 *** '(0.00)	0.03 '(0.68)	-0.03 '(0.65)	-0.13 '(0.20)	-0.35 '(0.30)	0.01 '(0.94)	0.02 '(0.96)	0.02 '(0.68)	-0.05 * '(0.09)	-0.01 '(0.88)	0.42 * '(0.05)
stM3	-0.08 '(0.20)	-0.01 '(0.91)	0.00 '(0.91)	0.04 '(0.34)	0.07 * '(0.09)	0.01 '(0.95)	0.36 * '(0.05)	0.03 '(0.46)	-0.03 '(0.43)	-0.03 '(0.64)	-0.11 * '(0.06)
Constant	0.02 '(0.63)	0.03 '(0.39)	0.04 '(0.32)	-0.05 '(0.27)	0.60 *** '(0.00)	0.02 '(0.52)	-0.31 ** '(0.04)	0.01 '(0.85)	0.02 '(0.47)	0.02 '(0.53)	0.01 '(0.56)
F	1.34	1.02	0.83	1.55	4.99	0.63	0.84	1.82	2.88	3.79	1.97
R2	0.26	0.21	0.19	0.29	0.59	0.14	0.18	0.32	0.43	0.57	0.34
R2 adj.	0.07	0.01	-0.04	0.10	0.47	-0.08	-0.03	0.15	0.28	0.42	0.17
N	154	154	141	154	145	155	154	154	150	123	155

## Dependent variable: Value added growth

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
shM3	0.30 *** '(0.00)	-0.02 '(0.82)	0.17 *** '(0.01)	-0.14 '(0.12)	0.04 '(0.93)	-0.07 '(0.70)	0.45 '(0.20)	0.02 '(0.73)	-0.03 '(0.22)	0.06 '(0.58)	0.20 '(0.18)
stM3	-0.21 *** '(0.00)	0.00 '(0.98)	-0.01 '(0.61)	-0.01 '(0.75)	0.02 '(0.62)	0.02 '(0.78)	0.15 '(0.38)	0.04 '(0.30)	0.01 '(0.87)	-0.13 '(0.12)	0.00 '(0.96)
Constant	0.12 *** '(0.00)	0.01 '(0.82)	-0.01 '(0.81)	0.02 '(0.72)	0.55 *** '(0.00)	0.00 '(0.94)	-0.15 '(0.26)	-0.02 '(0.51)	0.00 '(0.97)	-0.01 '(0.81)	0.00 '(0.84)
F	1.58	1.14	1.89	2.26	3.00	0.93	0.72	1.90	1.72	2.83	3.97
R2	0.29	0.23	0.35	0.37	0.46	0.20	0.16	0.33	0.31	0.50	0.51
R2 adj.	0.11	0.03	0.17	0.21	0.31	-0.02	-0.06	0.16	0.13	0.32	0.38
N	154	154	141	154	145	155	154	154	150	123	155

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Table B.5

## Panel regression results 2

## Dependent variable: Total factor productivity growth

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
shM	0.34 ** '(0.04)	-0.10 '(0.60)	0.23 '(0.27)	-0.20 '(0.11)	0.42 '(0.58)	0.02 '(0.97)	0.13 '(0.81)	0.37 ** '(0.04)	-0.07 '(0.72)	0.87 ** '(0.03)	0.82 *** '(0.00)
stM3	-0.01 '(0.92)	0.02 '(0.56)	0.01 '(0.75)	-0.05 '(0.23)	0.03 '(0.33)	0.00 '(0.99)	0.28 * '(0.05)	0.09 ** '(0.04)	-0.07 ** '(0.02)	-0.10 * '(0.10)	0.00 '(0.98)
Constant	-0.04 '(0.38)	-0.01 '(0.88)	0.01 '(0.88)	0.03 '(0.55)	0.58 *** '(0.00)	0.01 '(0.88)	-0.26 * '(0.08)	-0.09 ** '(0.05)	0.04 '(0.23)	-0.04 '(0.56)	-0.09 ** '(0.03)
F	1.05	0.81	0.66	1.26	4.30	0.76	0.76	2.43	1.35	3.65	2.37
R2	0.22	0.18	0.16	0.25	0.55	0.17	0.17	0.39	0.26	0.56	0.38
R2 adj.	0.01	-0.04	-0.08	0.05	0.42	-0.05	-0.05	0.23	0.07	0.41	0.22
N	154	149	137	149	145	155	149	150	150	120	150

## Dependent variable: Labour productivity growth

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
shM	0.20 '(0.25)	0.00 '(0.97)	0.05 '(0.76)	-0.13 '(0.25)	0.43 '(0.55)	0.11 '(0.82)	0.12 '(0.83)	0.09 '(0.46)	-0.19 '(0.34)	0.41 * '(0.08)	0.70 ** '(0.01)
stM3	0.03 '(0.55)	0.01 '(0.85)	-0.01 '(0.84)	0.02 '(0.68)	0.04 '(0.22)	0.01 '(0.88)	0.37 ** '(0.02)	0.03 '(0.44)	-0.05 * '(0.06)	-0.05 '(0.39)	0.00 '(0.95)
Constant	-0.05 '(0.35)	0.03 '(0.43)	0.03 '(0.47)	-0.03 '(0.52)	0.58 *** '(0.00)	0.01 '(0.73)	-0.32 ** '(0.04)	0.00 '(0.95)	0.05 '(0.11)	-0.04 '(0.39)	0.00 '(1.00)
F	1.04	1.02	0.82	1.53	4.94	0.63	0.85	1.82	2.77	4.07	2.08
R2	0.22	0.21	0.19	0.29	0.59	0.14	0.18	0.32	0.42	0.59	0.35
R2 adj.	0.01	0.00	-0.04	0.10	0.47	-0.08	-0.03	0.15	0.27	0.44	0.18
N	154	154	141	154	145	155	154	155	150	124	155

## Dependent variable: Value added growth

	AT	BE	DK	ES	FI	FR	IE	NL	PT	SE	UK
shM	0.33 ** '(0.05)	-0.12 '(0.30)	0.16 '(0.33)	-0.12 '(0.20)	1.01 '(0.26)	0.06 '(0.87)	0.46 '(0.37)	0.10 '(0.44)	-0.15 '(0.39)	0.70 *** '(0.01)	0.22 '(0.26)
stM3	-0.07 '(0.15)	-0.01 '(0.86)	0.01 '(0.78)	-0.04 '(0.29)	0.02 '(0.63)	0.01 '(0.92)	0.29 ** '(0.04)	0.04 '(0.29)	-0.01 '(0.59)	-0.09 '(0.12)	0.04 '(0.21)
Constant	0.03 '(0.54)	0.02 '(0.53)	-0.01 '(0.74)	0.04 '(0.37)	0.51 *** '(0.00)	-0.01 '(0.81)	-0.26 * '(0.07)	-0.02 '(0.54)	0.02 '(0.41)	-0.12 ** '(0.04)	-0.01 '(0.70)
F	1.11	1.18	1.57	2.23	3.07	0.92	0.69	1.91	1.69	3.27	3.94
R2	0.23	0.24	0.31	0.37	0.47	0.20	0.15	0.33	0.31	0.54	0.51
R2 adj.	0.02	0.04	0.11	0.20	0.32	-0.02	-0.07	0.16	0.13	0.37	0.38
N	154	154	141	154	145	155	154	155	150	124	155

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; t-values in brackets.

Table B.6

**Industry classification**

Code	Description	Taxonomy
AtB	Agriculture, hunting, forestry and fishing	Low
C	Mining and quarrying	Medium
15t16	Food, beverages and tobacco	Low
17t19	Textiles, leather and footwear	Low
20	Wood and cork	Low
21t22	Pulp, paper, printing and publishing	Medium
23	Coke, refined petroleum products and nuclear fuel	Medium
24	Chemicals and chemical products	Medium
25	Rubber and plastic products	Medium
26	Other non-metallic mineral products	Low
27t28	Basic metals	Low
29	Machinery and equipment n.e.c.	Medium
30t33	Office machinery and computers	High
34t35	Motor vehicles, trailers and semi-trailers	High
36t37	Manufacture of furniture; manufacturing n.e.c.	Medium
E	Electricity, gas, steam and hot water supply	Medium
F	Construction	Low
50	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of automotive fuel	Low
51	Wholesale trade and commission trade, except of motor vehicles and motorcycles	Medium
52	Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	Medium
H	Hotels and restaurants	Low
60t63	Transport and storage	Medium
64	Post and telecommunications	Medium
J	Financial intermediation, except insurance and pension funding	High
70	Real estate activities	Medium
71t74	Renting of machinery and equipment and other business activities	High
L	Public administration and defence; compulsory social security	High
M	Education	High
N	Health and social work	High
O	Sewage and refuse disposal, sanitation and similar activities	High
P	Private households with employed persons	Medium
Q	Extra-territorial organizations and bodies	Low

## 3.2 Migrants and regional performance

### 3.2.1 *Descriptive regressions on (high-skilled) migration and regional performance*

In this part of the study we analyze the effects of migration on regional economic performance at the NUTS 2-digit level in the EU-15 countries. The regional performance indicators we shall include in this analysis are GDP per capita growth and value added growth. It is not possible at the regional level to study the effects on total factor productivity growth for lack of data. The data sources we use is the European Labour Force Survey (ELFS) as already described above and the Eurostat regional database. The analysis in this part is restricted to the EU-15 countries as the shares of migrants in the other EU countries are quite low. Second, we restrict the analysis to the period 2000-2006 in general. In some cases only the period 2000-2005 is covered for data availability reasons. The main reason for this is that the European Labour Force survey data (ELFS) exhibits methodological breaks for some countries in the years before 2000 and data after 2006 are not available at the regional level so far.

Explaining regional GDP per capita growth is a delicate task as the number of potential control variables is quite large and results might depend upon these controls. There is now a large literature on determining the factors of (regional) growth in the empirical growth literature. These are mostly based on model selection approaches (like Bayesian model averaging) or shrinkage estimators. We therefore use the following strategy: Based on the results of Crespo Cuaresma et al. (2010) we include the growth determinants which turned out to be robust and additionally include the migrant variables, i.e. the share of migrants in total employed persons (shM), the share of highly educated migrants in total highly educated employed persons (shM3) and the share of highly educated migrants in total migrants (stM3). However, as the correlation between shM and shM3 is very high (above 0.9) we only include one of those. The control variables we take from Crespo Cuaresma et al. (2010) are a dummy for the capital city, the share of highly educated workers and the initial GDP per capita. Further the share of gross fixed capital formation in GDP is also a robust determinant when including country fixed effects. We also use the same variables when looking at general growth performance.

Results of this simple exercise are reported in Table 28. The migrant variables are not at all significant in the productivity regressions. However, in the growth regressions these are significant when including country dummies. The results when excluding the capital city regions are quite similar.<sup>6</sup>

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<sup>6</sup> Results are available upon request.

Table 28

### Cross-section results

**Dependent variable: Labour productivity growth**

	1	2	3	4	5	6
GDPcap	-0.01 *** '(0.001)	-0.01 *** '(0.000)	-0.02 *** '(0.000)	-0.01 *** '(0.005)	-0.01 *** '(0.003)	-0.01 *** '(0.004)
ShSH	0.05 *** '(0.002)	0.04 *** '(0.003)	0.04 *** '(0.003)	0.07 *** '(0.000)	0.06 *** '(0.000)	0.07 *** '(0.000)
shGFCF	-0.00 '(0.776)	-0.00 '(0.801)	-0.00 '(0.789)	0.01 '(0.305)	0.01 '(0.315)	0.01 '(0.373)
Capital		0.01 *** '(0.000)	0.01 *** '(0.000)		0.00 '(0.187)	0.00 '(0.150)
ShM	0.00 '(0.974)	-0.00 '(0.714)		0.01 '(0.197)	0.01 '(0.291)	
ShM3			0.00 '(0.835)			0.01 '(0.484)
stM3	0.01 '(0.298)	0.01 '(0.312)	0.01 '(0.253)	-0.00 '(0.546)	-0.00 '(0.493)	-0.01 '(0.349)
F	8.75	11.62	11.60	14.22	13.63	13.54
R2	0.20	0.28	0.28	0.61	0.61	0.61
R2 adj.	0.18	0.26	0.26	0.57	0.57	0.57
N	184	184	184	184	184	184
Country dummies	No	No	No	Yes	Yes	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; p-values in brackets.

**Dependent variable: Value added growth**

	1	2	3	4	5	6
GDPcap	-0.01 ** '(0.027)	-0.01 *** '(0.001)	-0.01 *** '(0.000)	-0.00 '(0.539)	-0.00 '(0.457)	-0.00 '(0.535)
ShSH	0.05 ** '(0.012)	0.04 ** '(0.018)	0.04 ** '(0.023)	0.06 *** '(0.001)	0.06 *** '(0.003)	0.06 *** '(0.002)
shGFCF	-0.02 '(0.276)	-0.01 '(0.273)	-0.01 '(0.268)	0.02 '(0.100)	0.02 '(0.103)	0.02 '(0.122)
Capital		0.01 *** '(0.000)	0.01 *** '(0.000)		0.00 '(0.468)	0.00 '(0.361)
ShM	0.00 '(0.790)	-0.00 '(0.923)		0.03 ** '(0.012)	0.03 ** '(0.018)	
ShM3			0.01 '(0.470)			0.03 ** '(0.026)
stM3	0.01 '(0.571)	0.00 '(0.608)	0.01 '(0.569)	-0.01 * '(0.050)	-0.01 ** '(0.046)	-0.02 *** '(0.009)
F	4.53	7.22	7.32	16.41	15.53	15.44
R2	0.11	0.20	0.20	0.64	0.64	0.64
R2 adj.	0.09	0.17	0.17	0.60	0.60	0.60
N	184	184	184	184	184	184
Country dummies	No	No	No	Yes	Yes	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; p-values in brackets.

Next we turn to panel regression results. Here we include the same set of variables however we also take account of unobserved characteristics of the particular regions by using panel techniques. The only variable which is no longer included is the capital city dummy. We report however the results for both including (specifications 1-6) and excluding the capital city region (specifications 7-12) from the regressions. Table 29 reports the random effects results whereas Table 30 the fixed effects results. The specifications are differentiated by the inclusion of different set of dummy variables and migrant variables for reasons of potential multicollinearity. For these reasons and the test statistics specifications 6 and 12 might be considered as the preferred ones.

Table 29

## Panel regression results (random effects)

Dependent variable: Labour productivity growth

	All regions						Excluding capital city regions					
	1	2	3	4	5	6	7	8	9	10	11	12
L.lnGDPcap0	-0.02 *** '(0.000)	-0.01 *** '(0.006)	-0.02 *** '(0.000)	-0.02 *** '(0.000)	-0.01 *** '(0.004)	-0.02 *** '(0.000)	-0.02 *** '(0.000)	-0.01 *** '(0.007)	-0.02 *** '(0.000)	-0.03 *** '(0.000)	-0.01 *** '(0.003)	-0.02 *** '(0.000)
ShSH	0.03 * '(0.063)	0.05 ** '(0.016)	0.00 '(0.877)	0.05 *** '(0.001)	0.08 *** '(0.000)	0.03 * '(0.089)	0.03 * '(0.098)	0.06 *** '(0.007)	0.01 '(0.812)	0.06 *** '(0.000)	0.09 *** '(0.000)	0.03 '(0.145)
ShGFCF	0.06 *** '(0.000)	0.01 '(0.489)	-0.01 '(0.700)	0.06 *** '(0.000)	0.01 '(0.571)	-0.01 '(0.589)	0.07 *** '(0.000)	0.01 '(0.506)	-0.01 '(0.680)	0.06 *** '(0.000)	0.01 '(0.597)	-0.01 '(0.571)
ShM	0.09 ** '(0.019)	0.10 ** '(0.025)	0.13 *** '(0.001)	0.04 *** '(0.001)	-0.00 '(0.779)	0.01 '(0.502)	0.12 *** '(0.001)	0.11 ** '(0.018)	0.12 *** '(0.003)	0.04 *** '(0.005)	0.00 '(0.998)	0.01 '(0.525)
ShM3	-0.05 '(0.175)	-0.12 ** '(0.014)	-0.13 *** '(0.001)					-0.10 ** '(0.016)	-0.12 ** '(0.012)	-0.13 *** '(0.004)		
stM3	0.05 *** '(0.000)	0.03 ** '(0.033)	0.06 *** '(0.000)	0.04 *** '(0.000)	0.01 '(0.594)	0.03 *** '(0.001)	0.25 *** '(0.000)	0.15 *** '(0.001)	0.22 *** '(0.000)	0.26 *** '(0.000)	0.15 *** '(0.001)	0.22 *** '(0.000)
Chi2	423.92	236.95	625.31	421.87	229.84	610.21	417.91	221.07	576.08	410.31	213.74	563.81
R2 within	0.26	0.04	0.26	0.26	0.05	0.26	0.26	0.05	0.26	0.25	0.05	0.25
R2 between	0.36	0.73	0.74	0.37	0.73	0.73	0.44	0.75	0.76	0.43	0.75	0.76
R2 overall	0.28	0.18	0.36	0.28	0.17	0.36	0.29	0.18	0.36	0.29	0.17	0.35
Obs.	1132	1132	1132	1132	1132	1132	1053	1053	1053	1053	1053	1053
Nr. of groups	194	194	194	194	194	194	180	180	180	180	180	180
Time dummies	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Country dummies	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; p-values in brackets.

Dependent variable: Value added growth

	All regions						Excluding capital city regions					
	1	2	3	4	5	6	7	8	9	10	11	12
L.lnGDPcap0	-0.02 *** '(0.000)	-0.01 '(0.119)	-0.01 ** '(0.011)	-0.02 *** '(0.000)	-0.01 '(0.100)	-0.01 *** '(0.008)	-0.02 *** '(0.000)	-0.01 '(0.159)	-0.01 *** '(0.007)	-0.02 *** '(0.000)	-0.01 '(0.114)	-0.01 *** '(0.003)
ShSH	0.05 ** '(0.011)	0.04 ** '(0.043)	-0.00 '(0.821)	0.05 *** '(0.002)	0.06 *** '(0.003)	0.01 '(0.459)	0.04 ** '(0.024)	0.05 ** '(0.030)	-0.01 '(0.790)	0.05 *** '(0.000)	0.07 *** '(0.002)	0.01 '(0.580)
ShGFCF	0.10 *** '(0.000)	0.04 ** '(0.033)	0.02 '(0.200)	0.10 *** '(0.000)	0.04 ** '(0.040)	0.02 '(0.238)	0.10 *** '(0.000)	0.04 ** '(0.023)	0.03 '(0.147)	0.10 *** '(0.000)	0.04 ** '(0.029)	0.02 '(0.179)
ShM	0.05 '(0.188)	0.09 ** '(0.036)	0.12 *** '(0.002)	0.05 *** '(0.000)	0.03 ** '(0.035)	0.04 *** '(0.001)	0.09 ** '(0.031)	0.11 ** '(0.014)	0.12 *** '(0.003)	0.05 *** '(0.000)	0.04 ** '(0.014)	0.05 *** '(0.001)
ShM3	0.00 '(0.998)	-0.07 '(0.137)	-0.09 ** '(0.040)					-0.09 * '(0.295)	-0.09 ** '(0.081)	-0.09 ** '(0.044)		
stM3	0.04 *** '(0.002)	0.02 '(0.145)	0.05 *** '(0.000)	0.04 *** '(0.000)	0.01 '(0.573)	0.03 *** '(0.002)	0.20 *** '(0.000)	0.09 * '(0.054)	0.15 *** '(0.000)	0.20 *** '(0.000)	0.09 ** '(0.043)	0.16 *** '(0.000)
Chi2	428.67	294.12	681.55	428.87	291.59	675.34	414.04	261.23	609.54	413.14	257.68	603.68
R2 within	0.25	0.04	0.25	0.25	0.04	0.25	0.25	0.04	0.25	0.25	0.04	0.25
R2 between	0.40	0.76	0.76	0.40	0.75	0.75	0.45	0.76	0.77	0.46	0.76	0.77
R2 overall	0.29	0.21	0.38	0.29	0.21	0.38	0.29	0.20	0.37	0.29	0.20	0.37
Obs.	1132	1132	1132	1132	1132	1132	1053.00	1053	1053	1053	1053	1053
Nr. of groups	194	194	194	194	194	194	180.00	180	180	180	180	180
Time dummies	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Country dummies	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; p-values in brackets.

Table 30

## Panel regression results (fixed effects)

Dependent variable: Labour productivity growth

	All regions						Excluding capital city regions					
	1	2	3	4	5	6	7	8	9	10	11	12
L.InGDPcap0	-0.42 *** '(0.000)	-0.08 *** '(0.000)	-0.42 *** '(0.000)	-0.42 *** '(0.000)	-0.08 *** '(0.000)	-0.42 *** '(0.000)	-0.44 *** '(0.000)	-0.08 *** '(0.000)	-0.44 *** '(0.000)	-0.44 *** '(0.000)	-0.08 *** '(0.000)	-0.44 *** '(0.000)
ShSH	0.09 ** '(0.025)	0.34 *** '(0.000)	0.09 ** '(0.025)	0.10 ** '(0.012)	0.36 *** '(0.000)	0.10 ** '(0.012)	0.10 ** '(0.018)	0.35 *** '(0.000)	0.10 ** '(0.018)	0.11 *** '(0.007)	0.38 *** '(0.000)	0.11 *** '(0.007)
ShGFCF	0.01 '(0.719)	0.01 '(0.886)	0.01 '(0.719)	0.02 '(0.653)	0.01 '(0.835)	0.02 '(0.653)	0.02 '(0.689)	0.01 '(0.826)	0.02 '(0.689)	0.02 '(0.633)	0.01 '(0.779)	0.02 '(0.633)
ShM	0.04 '(0.418)	0.16 ** '(0.015)	0.04 '(0.418)	-0.03 '(0.299)	0.04 '(0.220)	-0.03 '(0.299)	0.03 '(0.633)	0.14 ** '(0.037)	0.03 '(0.633)	-0.03 '(0.191)	0.03 '(0.337)	-0.03 '(0.191)
ShM3	-0.08 '(0.135)	-0.14 ** '(0.037)	-0.08 '(0.135)				-0.07 '(0.219)	-0.13 * '(0.065)	-0.07 '(0.219)			
stM3	0.02 '(0.257)	0.01 '(0.613)	0.02 '(0.257)	0.00 '(0.923)	-0.02 '(0.166)	0.00 '(0.923)	0.02 '(0.357)	0.01 '(0.680)	0.02 '(0.357)	0.00 '(0.959)	-0.02 '(0.191)	0.00 '(0.959)
Chi2	68.10	11.17	68.10	74.58	12.48	74.58	64.15	10.48	64.15	70.38	11.86	70.38
R2 within	0.45	0.07	0.45	0.45	0.06	0.45	0.45	0.07	0.45	0.45	0.06	0.45
R2 between	0.03	0.24	0.03	0.03	0.25	0.03	0.06	0.32	0.06	0.06	0.32	0.06
R2 overall	0.03	0.07	0.03	0.03	0.07	0.03	0.05	0.09	0.05	0.04	0.09	0.04
Obs.	1132	1132	1132	1132	1132	1132	1053	1053	1053	1053	1053	1053
Nr. of groups	194	194	194	194	194	194	180	180	180	180	180	180
Time dummies	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Country dummies												

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; p-values in brackets.

Dependent variable: Value added growth

	All regions						Excluding capital city regions					
	1	2	3	4	5	6	7	8	9	10	11	12
L.InGDPcap0	-0.40 *** '(0.000)	-0.07 *** '(0.000)	-0.40 *** '(0.000)	-0.40 *** '(0.000)	-0.07 *** '(0.000)	-0.40 *** '(0.000)	-0.41 *** '(0.000)	-0.07 *** '(0.000)	-0.41 *** '(0.000)	-0.41 *** '(0.000)	-0.07 *** '(0.000)	-0.41 *** '(0.000)
ShSH	0.12 *** '(0.003)	0.36 *** '(0.000)	0.12 *** '(0.003)	0.12 *** '(0.002)	0.37 *** '(0.000)	0.12 *** '(0.002)	0.12 *** '(0.004)	0.36 *** '(0.000)	0.12 *** '(0.004)	0.13 *** '(0.002)	0.38 *** '(0.000)	0.13 *** '(0.002)
ShGFCF	0.01 '(0.784)	0.00 '(0.919)	0.01 '(0.784)	0.01 '(0.762)	0.01 '(0.889)	0.01 '(0.762)	0.01 '(0.753)	0.01 '(0.867)	0.01 '(0.753)	0.01 '(0.731)	0.01 '(0.836)	0.01 '(0.731)
ShM	0.01 '(0.862)	0.12 * '(0.067)	0.01 '(0.862)	-0.01 '(0.615)	0.05 '(0.119)	-0.01 '(0.615)	0.00 '(0.936)	0.11 * '(0.092)	0.00 '(0.936)	-0.02 '(0.494)	0.04 '(0.173)	-0.02 '(0.494)
ShM3	-0.03 '(0.634)	-0.08 '(0.219)	-0.03 '(0.634)				-0.03 '(0.652)	-0.08 '(0.237)	-0.03 '(0.652)			
stM3	0.01 '(0.761)	-0.00 '(0.859)	0.01 '(0.761)	-0.00 '(0.961)	-0.02 '(0.137)	-0.00 '(0.961)	0.00 '(0.824)	-0.00 '(0.861)	0.00 '(0.824)	-0.00 '(0.882)	-0.02 '(0.143)	-0.00 '(0.882)
Chi2	64.19	11.68	64.19	70.65	13.70	70.65	59.70	10.66	59.70	65.71	12.50	65.71
R2 within	0.43	0.07	0.43	0.43	0.07	0.43	0.43	0.07	0.43	0.43	0.07	0.43
R2 between	0.00	0.17	0.00	0.00	0.18	0.00	0.03	0.23	0.03	0.03	0.23	0.03
R2 overall	0.01	0.06	0.01	0.01	0.06	0.01	0.03	0.07	0.03	0.03	0.07	0.03
Obs.	1132	1132	1132	1132	1132	1132	1053.00	1053	1053	1053	1053	1053
Nr. of groups	194	194	194	194	194	194	180.00	180	180	180	180	180
Time dummies	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Country dummies												

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; p-values in brackets.



In the random effects case the migrant variables are often positive and significant; in particular the variable capturing the share of high educated migrants in total migrants is rather robust across specifications. These results are partly lost when running fixed effects regressions however.

To circumvent potential endogeneity problems we also present results when using lagged variables as regressors. Results are reported in Tables 31 and 32 for the random and fixed effects case, respectively. The results in the random effects specification confirm more or less the results when using contemporaneous variables; in the fixed effects case the results tend to be less significant. However, some of the coefficients remain significantly positive in some specifications.

Table 31

## Panel regression results using lagged variables (random effects)

Dependent variable: Labour productivity growth

	All regions						Excluding capital city regions					
	1	2	3	4	5	6	7	8	9	10	11	12
L.lnGDPcap0	-0.03 *** '(0.000)	-0.02 *** '(0.001)	-0.02 *** '(0.000)	-0.03 *** '(0.000)	-0.02 *** '(0.001)	-0.02 *** '(0.000)	-0.03 *** '(0.001)	-0.02 *** '(0.000)	-0.02 *** '(0.000)	-0.03 *** '(0.000)	-0.02 *** '(0.001)	-0.02 *** '(0.000)
L.ShSH	0.05 *** '(0.001)	0.05 *** '(0.008)	0.03 '(0.106)	0.05 *** '(0.000)	0.07 *** '(0.000)	0.04 ** '(0.025)	0.06 *** '(0.001)	0.07 *** '(0.002)	0.03 '(0.116)	0.06 *** '(0.000)	0.08 *** '(0.000)	0.04 * '(0.051)
L.ShGFCF	0.06 *** '(0.000)	-0.00 '(0.843)	-0.01 '(0.576)	0.06 *** '(0.000)	-0.01 '(0.736)	-0.01 '(0.519)	0.07 *** '(0.000)	-0.00 '(0.901)	-0.01 '(0.625)	0.07 *** '(0.000)	-0.01 '(0.787)	-0.01 '(0.575)
L.ShM	0.04 '(0.303)	0.10 ** '(0.018)	0.06 * '(0.073)	0.04 *** '(0.000)	0.01 '(0.629)	0.02 '(0.245)	0.06 '(0.108)	0.10 ** '(0.024)	0.05 '(0.155)	0.04 *** '(0.001)	0.01 '(0.415)	0.02 '(0.213)
L.ShM3	0.01 '(0.805)	-0.10 ** '(0.019)	-0.06 '(0.139)									
L.stM3	0.03 *** '(0.007)	0.03 ** '(0.018)	0.03 *** '(0.006)	0.03 *** '(0.000)	0.01 '(0.257)	0.02 ** '(0.019)	0.03 *** '(0.002)	0.03 ** '(0.016)	0.03 *** '(0.006)	0.03 *** '(0.000)	0.01 '(0.163)	0.02 *** '(0.008)
Chi2	414.94	235.60	602.47	415.26	229.21	599.64	408.59	220.45	556.44	408.84	215.30	555.29
R2 within	0.26	0.05	0.26	0.26	0.05	0.26	0.25	0.06	0.25	0.25	0.06	0.25
R2 between	0.36	0.72	0.72	0.36	0.72	0.72	0.43	0.74	0.75	0.43	0.74	0.74
R2 overall	0.27	0.18	0.35	0.27	0.17	0.35	0.29	0.18	0.35	0.29	0.17	0.35
Obs.	1132	1132	1132	1132	1132	1132	1053	1053	1053	1053	1053	1053
Nr. of groups	194	194	194	194	194	194	180	180	180	180	180	180
Time dummies	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Country dummies	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; p-values in brackets.

Dependent variable: Value added growth

	All regions						Excluding capital city regions					
	1	2	3	4	5	6	7	8	9	10	11	12
L.lnGDPcap0	-0.02 *** '(0.000)	-0.01 * '(0.088)	-0.01 *** '(0.006)	-0.02 *** '(0.000)	-0.01 * '(0.078)	-0.01 *** '(0.005)	-0.02 *** '(0.000)	-0.01 '(0.123)	-0.01 *** '(0.002)	-0.02 *** '(0.000)	-0.01 * '(0.096)	-0.01 *** '(0.002)
L.ShSH	0.06 *** '(0.001)	0.04 * '(0.082)	0.01 '(0.538)	0.05 *** '(0.001)	0.05 ** '(0.011)	0.02 '(0.325)	0.06 *** '(0.001)	0.04 ** '(0.042)	0.01 '(0.624)	0.06 *** '(0.000)	0.06 *** '(0.007)	0.01 '(0.477)
L.ShGFCF	0.10 *** '(0.000)	0.03 '(0.137)	0.03 '(0.176)	0.10 *** '(0.000)	0.03 '(0.168)	0.02 '(0.193)	0.10 *** '(0.000)	0.04 * '(0.079)	0.03 '(0.100)	0.10 *** '(0.000)	0.04 '(0.102)	0.03 '(0.108)
L.ShM	0.01 '(0.714)	0.11 *** '(0.007)	0.08 ** '(0.030)	0.05 *** '(0.000)	0.04 *** '(0.007)	0.05 *** '(0.000)	0.03 '(0.370)	0.12 *** '(0.006)	0.07 ** '(0.046)	0.05 *** '(0.000)	0.05 *** '(0.002)	0.05 *** '(0.000)
L.ShM3	0.04 '(0.274)	-0.08 * '(0.064)	-0.04 '(0.351)									
L.stM3	0.03 ** '(0.027)	0.03 ** '(0.047)	0.03 ** '(0.022)	0.03 *** '(0.000)	0.01 '(0.022)	0.02 ** '(0.296)	0.03 ** '(0.011)	0.03 ** '(0.034)	0.03 ** '(0.018)	0.03 *** '(0.000)	0.01 '(0.194)	0.02 ** '(0.012)
Chi2	410.37	292.45	667.70	408.81	288.40	666.91	396.93	260.35	599.62	397.11	256.72	599.48
R2 within	0.25	0.04	0.25	0.25	0.05	0.25	0.25	0.04	0.25	0.25	0.05	0.25
R2 between	0.37	0.75	0.75	0.36	0.75	0.75	0.41	0.75	0.76	0.41	0.75	0.76
R2 overall	0.28	0.21	0.38	0.27	0.21	0.38	0.28	0.20	0.37	0.28	0.20	0.37
Obs.	1132	1132	1132	1132	1132	1132	1053.00	1053	1053	1053	1053	1053
Nr. of groups	194	194	194	194	194	194	180.00	180	180	180	180	180
Time dummies	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Country dummies	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; p-values in brackets.

Table 32

## Panel regression results using lagged variables (fixed effects)

Dependent variable: Labour productivity growth

	All regions						Excluding capital city regions					
	1	2	3	4	5	6	7	8	9	10	11	12
L.InGDPcap0	-0.42 *** '(0.000)	-0.09 *** '(0.000)	-0.42 *** '(0.000)	-0.42 *** '(0.000)	-0.08 *** '(0.000)	-0.42 *** '(0.000)	-0.44 *** '(0.000)	-0.09 *** '(0.000)	-0.44 *** '(0.000)	-0.44 *** '(0.000)	-0.08 *** '(0.000)	-0.44 *** '(0.000)
ShSH	0.12 *** '(0.004)	0.34 *** '(0.000)	0.12 *** '(0.004)	0.12 *** '(0.003)	0.35 *** '(0.000)	0.12 *** '(0.003)	0.14 *** '(0.001)	0.37 *** '(0.000)	0.14 *** '(0.001)	0.14 *** '(0.001)	0.38 *** '(0.000)	0.14 *** '(0.001)
ShGFCF	-0.01 '(0.823)	-0.08 '(0.124)	-0.01 '(0.823)	-0.01 '(0.866)	-0.07 '(0.148)	-0.01 '(0.866)	-0.01 '(0.833)	-0.07 '(0.197)	-0.01 '(0.833)	-0.01 '(0.860)	-0.07 '(0.222)	-0.01 '(0.860)
ShM	0.07 '(0.120)	0.24 *** '(0.000)	0.07 '(0.120)	0.01 '(0.597)	0.11 *** '(0.002)	0.01 '(0.597)	0.05 '(0.326)	0.20 *** '(0.001)	0.05 '(0.326)	0.01 '(0.803)	0.10 *** '(0.005)	0.01 '(0.803)
ShM3	-0.07 '(0.125)	-0.16 *** '(0.008)	-0.07 '(0.125)				-0.05 '(0.306)	-0.13 ** '(0.044)	-0.05 '(0.306)			
stM3	0.02 '(0.197)	0.02 '(0.166)	0.02 '(0.197)	0.00 '(0.676)	-0.01 '(0.717)	0.00 '(0.676)	0.01 '(0.278)	0.02 '(0.211)	0.01 '(0.278)	0.01 '(0.574)	-0.00 '(0.965)	0.01 '(0.574)
Chi2	68.58	13.39	68.58	75.10	14.58	75.10	64.83	12.88	64.83	71.20	14.59	71.20
R2 within	0.45	0.08	0.45	0.45	0.07	0.45	0.45	0.08	0.45	0.45	0.08	0.45
R2 between	0.03	0.20	0.03	0.03	0.21	0.03	0.07	0.27	0.07	0.07	0.27	0.07
R2 overall	0.03	0.06	0.03	0.03	0.06	0.03	0.05	0.08	0.05	0.05	0.08	0.05
Obs.	1132	1132	1132	1132	1132	1132	1053	1053	1053	1053	1053	1053
Nr. of groups	194	194	194	194	194	194	180	180	180	180	180	180
Time dummies	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Country dummies												

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; p-values in brackets.

Dependent variable: Value added growth

	All regions						Excluding capital city regions					
	1	2	3	4	5	6	7	8	9	10	11	12
L.InGDPcap0	-0.40 *** '(0.000)	-0.08 *** '(0.000)	-0.40 *** '(0.000)	-0.40 *** '(0.000)	-0.07 *** '(0.000)	-0.40 *** '(0.000)	-0.41 *** '(0.000)	-0.08 *** '(0.000)	-0.41 *** '(0.000)	-0.41 *** '(0.000)	-0.07 *** '(0.000)	-0.41 *** '(0.000)
ShSH	0.11 *** '(0.009)	0.32 *** '(0.000)	0.11 *** '(0.009)	0.11 *** '(0.008)	0.33 *** '(0.000)	0.11 *** '(0.008)	0.12 *** '(0.005)	0.34 *** '(0.000)	0.12 *** '(0.005)	0.12 *** '(0.004)	0.35 *** '(0.000)	0.12 *** '(0.004)
ShGFCF	0.01 '(0.743)	-0.05 '(0.302)	0.01 '(0.743)	0.02 '(0.713)	-0.05 '(0.340)	0.02 '(0.713)	0.02 '(0.709)	-0.04 '(0.439)	0.02 '(0.709)	0.02 '(0.691)	-0.04 '(0.475)	0.02 '(0.691)
ShM	0.07 '(0.156)	0.23 *** '(0.000)	0.07 '(0.156)	0.03 '(0.355)	0.12 *** '(0.001)	0.03 '(0.355)	0.05 '(0.297)	0.20 *** '(0.001)	0.05 '(0.297)	0.02 '(0.433)	0.11 *** '(0.002)	0.02 '(0.433)
ShM3	-0.05 '(0.279)	-0.14 ** '(0.022)	-0.05 '(0.279)				-0.04 '(0.470)	-0.11 * '(0.075)	-0.04 '(0.470)			
stM3	0.01 '(0.312)	0.02 '(0.232)	0.01 '(0.312)	0.00 '(0.673)	-0.00 '(0.749)	0.00 '(0.673)	0.01 '(0.385)	0.02 '(0.265)	0.01 '(0.385)	0.01 '(0.596)	0.00 '(0.980)	0.01 '(0.596)
Chi2	64.19	12.24	64.19	70.48	13.59	70.48	59.93	11.64	59.93	65.91	13.30	65.91
R2 within	0.43	0.07	0.43	0.43	0.07	0.43	0.43	0.08	0.43	0.43	0.07	0.43
R2 between	0.00	0.13	0.00	0.00	0.14	0.00	0.03	0.18	0.03	0.03	0.19	0.03
R2 overall	0.01	0.05	0.01	0.01	0.05	0.01	0.03	0.06	0.03	0.03	0.06	0.03
Obs.	1132	1132	1132	1132	1132	1132	1053.00	1053	1053	1053	1053	1053
Nr. of groups	194	194	194	194	194	194	180.00	180	180	180	180	180
Time dummies	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Country dummies												

Note: \*\*\*, \*\*, \* denote significance at the 1, 5 and 10 % level; p-values in brackets.

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