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Labour mobility within the EU in the context of enlargement and the functioning of the transitional arrangements

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Deliverable 6

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Brain drain, brain gain and brain waste

Abstract

Despite a rapidly growing scholarly interest in skilled migration generally, there is as yet only limited evidence on the extent and effects of the outflow of skilled workers from the New Member States (NMS), the so-called "brain drain". Economic theory predicts that a brain drain can have positive or negative impacts on the sending country, and so any assessment of the actual effect remains but an adverse impact of skilled migration upon the sending country cannot be ruled out a priori. The assessment of its effects becomes an empirical issue. Drawing robust conclusions from the empirical evidence is difficult, partly because of severe data limitations, but it is important because the lack of evidence is matched by a widespread popular perception that skilled migration represents a significant economic problem for NMS.

The aim of this report is to provide an assessment of the scale and impact of highly skilled migration from the NMS. We draw mainly on Labour Force Surveys from each of the EU27 countries in 2006. The statistical analysis confirms that migrants from the NMS are positively selected with respect to education. This education differential is not simply that the result of differences in the age structure. However, claims about the size of the outflow of skilled workers may have been overemphasized. With regard to the impacts of highly skilled migration, we refer to both static effects (drain effect) and dynamic effects (brain effect). We show that the drain effect is rather limited and, at least in case of Poland, the most important sending country, recent mobility is to be understood in terms of brain overflow resulting from an oversupply of highly skilled labour. The brain effect, however, also appears to be limited, mainly due to the relatively low rates of return to human capital observed in main destination countries.

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Contents

1 Introduction

There is yet only limited evidence on the extent and effects of the outflow of skilled workers from the New Member States (NMS), despite a rapidly growing scholarly interest towards skilled migration. Nevertheless, there is widespread agreement that there has been a significant outflow of highly skilled workers from the area (Balaz *et al.,* 2004), and a perception that the outflow has had a negative impact on the average human capital endowment of the domestic workforce, and a resulting detrimental effect on economic growth (Radu 2003; Straubhaar and Wolburg 1999; Wolburg 1996; Wolburg and Wolter 1997; Salt and Findlay, 1989; Salt 1997, 2001).

A major obstacle to the analysis of migration from the NMS countries is the lack, or the poor reliability, of statistical data.[1] This report represents an important step towards a more solid understanding of the scale of skilled migration from NMS, and of its impact on sending countries. The impacts of recent highly skilled mobility are difficult to estimate. This is not only due to data limitations, but also to the complexity of the phenomenon. In this report we attempt to assess both positive and negative features of the phenomenon by looking at both static and dynamic aspects.

We start by assessing the scale of highly skilled mobility in the post-2004 period, with an analysis of the selection of migrants from the population as a whole. We argue that an integrated approach to the analysis of skilled migration is needed, and we suggest that harmonised Labour Force Surveys can be used as a consistent data source in both migrant-sending and migrant-receiving EU countries.

The analysis then concentrates on exploring two main issues. First, does the structure of the recent outflow merely reflect the composition of the sending countries' populations (in terms of age and education)? Is the scale of the drain of highly skilled therefore exaggerated for this reason? Second, how have the institutional changes related to EU-enlargement (particularly the introduction of Transitional Arrangements) influenced post-2004 migratory patterns? How have these changes influenced the patterns of highly skilled mobility?

It is important to note that we do not provide an account of the overall economic impact of migration for NMS, as several relevant aspects — such as those defined by Grubel and Scott (1966) — exceed the scope of this report. For example, we will neither deal with the ensuing flow of remittances, nor with their possible impact on trade patterns, on foreign direct investment flows or on technological spillovers. Still, we argue that this research represents an important step forward in a context where there is a very limited understanding, and this may also lay the ground for further research on the economic impact of migration from NMS.

[1] Poland represents an isolated exception. Official sources of information, such as register and census data, tend to greatly underestimate the scale of migration, and especially the scale of migration by highly skilled individuals. This can lead to underestimates of the scale of the brain drain (Fihel *et al*., 2006).

The structure of the report is as follows. Section 1 defines the scope of the analysis and Section 2 provides a description of the main methodological challenges that have to be addressed. Section 3 provides a brief overview of the relevant theoretical and empirical literature on the impact of skilled migration upon sending countries. Section 4 summarises the patterns of skilled migration from the NMS, using both existing international datasets and also Labour Force Surveys conducted in origin and destination countries. Section 5 considers the background of the observed migration processes. Section 6 provides, firstly, an in-depth analysis of the highly skilled mobility and selectivity issues presented for Poland, and, secondly, offers an assessment of the impact of recent mobility on source countries. Section 7 includes two case studies relevant to the study and dealing with mobility of medical professionals, and students. Section 8 concludes.

2 Methodological Issues

The aim of this report is to provide an integrated assessment of the scale of highly skilled migration from the NMS and its impacts on source countries. As a first step, this requires reliable data on the size of the outflow of skilled workers, and then to use these data to provide an assessment of whether the consequences of this *outflow* are beneficial or detrimental for NMS.

It is important to note that the heading "NMS" hides significant differences with respect to the aggregate size of current migration flows.[2] The limited size of pre- and post-accession migration flows from the Czech Republic, Hungary and Slovenia[3] means that concerns about the negative effects of the outflow are very limited. We therefore focus more on those countries that are experiencing larger outflows. In particular Poland has experienced large outflows and has migration data of relatively high quality and reliability.

A simple comparison of the skill composition of current migration flows with the corresponding composition of the resident population represents an important first step — and even a challenging one given existing data limitations, but it cannot support any conclusion about the detrimental or beneficial character of current migration patterns.[4] Even when one observes that skilled workers are over-represented among migrants, further evidence is needed before one can conclude that migration is reducing the human capital endowment of the country of origin. For example, a positive selection of migrants

[2] See Deliverable 2 for information on aggregate flows from NMS.

[3] For example, the proportion of Hungarian R&D personnel working abroad for more than 6 months was estimated at 2% in 2001, but immigration led the net balance of R&D personnel in Hungary to be close to zero (Inzelt, 2003).

[4] Note that the higher propensity of younger individuals to migrate means that any direct comparison of the skill composition of the migrant and resident population is going to be influenced by the different age structure of the two groups. When average educational achievement is negatively related to age — as it is the case of the NMS (see Section 3), then it is informative to estimate cohort-specific measures of the skill composition of the migrant and of the resident population, in order to gain a better understanding of the extent to which migration is selective with respect to education.

with respect to education may lead to an substantial increase in educational investments determined by the migration prospect itself, and this is precisely the critical factor that simple descriptive statistics on skill composition fail to reveal.[5] This factor can be at least partly captured by some data on the evolution of tertiary and secondary enrolment rates (see Section 4).

With respect to the definitional issues, there is no international system of recoding skilled migration, as there is no accordance on what the term "skilled" should mean (Lowell and Findlay, 2002; Salt, 1997). The term "skilled" is usually interpreted in the literature in terms of the formal level of education and qualifications, which is relatively easy to measure (e.g. in years of formal education), contrary to other possible definitions of skills (Csedö, 2008). It is common practice to identify skilled individuals with highly educated workers, as it is hard to gather reliable information on the extent of "on-the-job" experience,[6] not to mention the difficulty in measuring something as fuzzy as innate ability, although these two components are admittedly important factors in determining the skill level of a worker. In this research we will adhere to a definition of skilled worker based on years of formal education, and — as Dumont and Lemaître (2005) and Docquier and Marfouk (2004) — we move beyond a strict dichotomy between skilled and unskilled workers, attempting to provide statistics also on the migration of workers that hold a secondary-degree or vocational training.[7] However, in accordance with the wide typology of skilled migrants presented by Salt (1997), we will extend the analysis to incorporate post-secondary students, a group which, although not yet formally qualified, forms part of the phenomenon of (potential) skill flows. The general analysis of individuals with tertiary education or gaining tertiary education will be supplemented by a case study of medical health care workers.

We will use the most commonly used meaning of the term *brain drain*, i.e. it will be understood as selective migration of well educated people (typically from less- towards more-developed countries. The term "brain drain" is sometimes used with regard to the impacts of highly skilled mobility, i.e. in such cases when emigration of tertiary educated persons for permanent or long stays abroad reaches significant levels, visible in the economy, and is not offset by welfare gains or feedback effects from remittances, technology transfer, investments, or trade. In this case the negative effects of the flow on the economy of the sending country dominate. On the other hand, a "*brain gain"* occurs if the sending country experiences net benefits (for example in terms of welfare) from the emigration of the skilled. A positive effect may dominate as the possibility of working

[5] By similar arguments, one could argue that if a positive selection of migrants with respect to education is matched by high domestic unemployment rates for qualified people, then this signals the existence of a likely overinvestment in education that could not be sustainable anyway, so that an eventual later decline in educational investments should not be attributed to current migration patterns.

[6] OECD (2002) proposes a definition of highly skilled workers that includes workers that completed tertiary education, and workers that did not complete tertiary education but are employed in occupation where such a qualification is usually required. This definition that captures the idea of skill acquisition through "on-the-job" experience, is data-demanding and thus hard to implement.

[7] Whenever possible, we will attempt to distinguish different types of mobility (such as short-term migration or repeated migration spells), as these could have different economic impacts on sending countries. Distinguishing between these different types, however, is often not possible with the available data.

abroad for higher wages may create an incentive to pursue education, which in turn may raise domestic educational levels and stimulate economic growth (Stark, 2004).

With regard to consequences of the outflow of skilled workers for the sending country, we consider both static and dynamic aspects captured by the *brain effect*/*drain effect* dichotomy as understood by Beine *et al.* (2001), as well as other labour market effects such as the *brain overflow* (see theoretical discussion and definitions of the possible effects of the brain drain in Section 2). As far as migrants themselves are concerned, an important dimension of the analysis of the effects of the mobility of high skilled labour arises from considering the extent to which the migrants' qualifications are "adequately" employed in the receiving country. When highly skilled workers migrate into forms of employment not requiring the application of their skills and experience, *brain waste* may occur (Salt, 1997). We argue that this perspective is particularly useful in the context of the project.

An attempt to assess the impacts of the outflow of skilled workers from the NMS poses several analytical challenges. The first one relates to the statistical assessment of the phenomenon. Official sources of information, although in principle consistent with a definition based on years of formal education, offer a frail ground to analyze migration from the NMS. Population registers fail to record the migrants who left the country but did not modify their residence status, whereas population censuses most often provide no information about the individuals who left the country after the previous round of the census.[8] We argue that harmonised LFS can represent a way to overcome current data limitations, and to derive sound estimates about the skill composition of migration flows from NMS, and to implement the integrated approach that we deem as necessary to achieve a proper balance of the impact of the impact of migration upon the human capital endowment of these countries.

The next problem is the difficulty of defining an adequate *counterfactual* against which we can assess the impact of migration upon human capital formation This counterfactual should be informative about the human capital endowment that the NMS would be experiencing in a *no-migration* (or in a *pre-accession*) scenario. A combination of different data sources shall help to achieve a better approximation of a reliable counterfactual.

3 Theoretical background

The economic literature on the consequences of skilled migration for sending countries is usually divided into two distinct parts. The first dates back to the 1970s, and produced a theoretical consensus that regarded the impact of skilled emigration as detrimental. The second, from the 1990s, reversed the earlier theoretical consensus, and attempted to

[8] A further problem with data sources is that national statistics differ across countries with respect to the adopted definition of a skilled worker; Poland, for instance, defines a highly skilled individual as a university graduate who has also acquired at least a M.A. degree.

support its prediction of a possible *brain gain* with econometric analysis on newly collected international migration data. In fact this distinction is somewhat artificial. The earlier literature already contained elements that were later developed by the so called *new economics of brain drain*, and some of the more recent studies have provided some theoretical and empirical results that are actually closer to the pessimistic conclusions of the earlier literature.

Although a paper by Grubel and Scott (1966) had emphasized that positive feedback effects — in terms of remittances and technology acquisition — had the potential to offset the losses caused by the migration of skilled workers, the emphasis of the early literature was on the losses rather than the gains of the brain drain. In addition, the fiscal costs of providing public education to the migrants, and the existence of intra-generational positive educational externalities implied that the brain drain had detrimental welfare effects on non-migrants (e.g. Bhagwati and Hamada, 1974).[9]

A central innovation of the new economics of the brain drain is to model migration as a probabilistic event, i.e. the outcome of a lottery where the would-be migrant has a positive probability p of actually migrating, where $p<1$ (e.g. Stark *et al*., 1997; Mountford, 1997; Beine et al., 2001). This uncertainty is meant to reflect immigration restrictions (that became much tighter in most destination countries since the mid-1970s) and of subjective life events that could lead to the abandonment of a previous decision to migrate.

In these models, the decision to invest in education is driven by the expected return to human capital. A positive probability p of migrating to a high-wage country increases the expected return to investment in human capital compared to the no-migration situation.[10] This causes an increase in the optimal level of human capital[11] (e.g. Stark and Wang, 2002) or an increase in the number of people that decide to invest in education (e.g. Beine et al., 2001). It thus lays the ground for the existence of a *beneficial brain drain*, or "brain gain" (i.e. a situation where positive effects dominate negative effects). In the words of Beine *et al.* (2001), the negative (ex post, static) *drain effect* due to the migration of skilled workers can be more than offset by the positive (ex ante, dynamic) *brain effect*, i.e. the increased investment in education induced by migration itself. The key conclusion of the new economics of brain drain is that skilled migration can be beneficial for the migrant sending countries, even without accounting for the additional

[9] Such a theoretical prediction is not based (as is sometimes argued) on a narrow focus on the static effects of skilled migration and on a symmetric neglect of its dynamic implications, but rather on some critical modeling choices. For instance, Bhagwati and Hamada (1974) did consider the positive influence of the migration prospect upon the incentives to invest in education, an argument that represents the core of the recent literature. But the assumption that migration was an unconstrained individual choice entailed that such a positive dynamic effect had no impact for the country of origin of the migrants.

[10] Note that this implication critically hinges on the assumption that a high-wage country also has high returns to human capital, an assumption that is often not supported by the data (see the references to the empirical literature contained in McKenzie and Rapoport, 2008).

[11] Stark and Wang (2002) pushed this implication further, arguing that migration can substitute for public subsidies to education, a theoretical conclusion that has been recently challanged by Docquier *et al.* (2008).

positive feedback effects suggested by Grubel and Scott (1966). In this report we will follow this particular line of reasoning on the effects of highly skilled mobility.

Early attempts to gather internationally comparable data on skill-specific migration rates (Barro and Lee, 1993; Carrington and Detragiache, 1998) provided a very limited coverage of NMS. More recently they have been extended by Dumont and Lemaître (2005) and Docquier and Marfouk (2004), later adjusted by Beine *et al.* (2007) to correct for skill acquisition abroad. This has offered the opportunity to assess the empirical validity of the theoretical predictions of the new economics of the brain drain, and the results are broadly consistent with the idea that there is a possibility for the *beneficial brain drain* to occur (Beine *et al.,* 2001, 2008; Docquier *et al.*, 2008). Individual country-studies, such as McKenzie and Rapoport (2008) on Mexico, have shown that the reverse can occur, with a reduction in educational attainment in the areas characterized by higher emigration rates. Such a finding may be explained by the fact that migrants experience very low (or even zero) returns to human capital in the destination countries. High-wage countries need not be (at least for the migrants) high-return to human capital countries. Recent theoretical contributions (Egger and Felbermayr, 2007; Brücker *et al.*, 2007) have shown that the optimistic conclusions of the newer literature crucially hinge on this assumption, and the scope for a *beneficial brain drain* can be substantially reduced.

This latter point has a critical methodological implication for the study. The analysis of the impact of migration upon migrant sending countries cannot be separated from an analysis of the labour market performance of migrants in destination countries. The occurrence of so-called *brain waste* (e.g. Mattoo *et al.*, 2005), a situation where migrants are employed in occupations for which they are over-qualified, influences the impact of migration itself upon human capital formation in migrant sending countries. This need for an *integrated approach* to the analysis of migration breaks down the usual separation between analysis focused either on migrant-destination countries or on migrant-sending countries. The research on the economic effects of migration upon the countries of origin thus needs to draw insights also from one of the main components of the literature upon destination countries, namely the analysis of the labour market *assimilation* of the migrants (e.g. Chiswick, 1978).

A slightly different category of effects, albeit impossible to disentangle form the previous ones, is *brain overflow*. This effect occurs when there is (intentional or unintentional) oversupply of educated professionals in the sending country. In such a case, migration of the highly skilled occurs at low or zero alternative costs, and reduces the labour market supply-demand inequality in the sending country. Additionally, when a brain overflow occurs, both the drain and the brain effects are limited. The drain effect is unimportant because of the probable high domestic unemployment rate for skilled workers. The brain effect is unimportant because domestic labour market conditions do not adequately reward skill formation.

4 Scope of the phenomena – overview of highly skilled migration from NMS

One goal of this research project is to move beyond current data sources and employ micro data drawn from the Labour Force Surveys (LFS). We begin by comparing descriptive statistics from the LFS with those from the most common international data sources, that is Dumont and Lemaître (2005), Docquier and Marfouk (2004) and Beine *et al.* (2007). These datasets gather information about foreigners and foreign-born individuals from censuses, or administrative registers, from OECD member countries, and then compare these data with information on the resident population in migrant sending countries to break down aggregate migration figures by skill composition, and to derive estimates of skill-specific emigration rates.[12] The term emigration rate needs to be interpreted with caution, as what Dumont and Lemaître (2005) and Docquier and Marfouk (2004) actually define as such is the ratio of the population born in – or holding the citizenship of - a given country and currently residing in OECD countries over the population residing in the home country.[13] Thus, this measure — both in its aggregate and in its skill-specific versions — captures migration flows that have been accumulating over a long period of time, and it thus conveys relatively limited information on the recent pattern of migration.[14]

With these caveats in mind, Table 1 reports the estimates of the emigration rates, broken down by educational level, from the NMS for the year 2000,[15] while Table 2 displays information about the skill composition — also referred to as the selection rate — of current migrants to OECD countries from NMS.

[12] We refer to Dumont and Lemaître (2005) and Docquier and Marfouk (2004) for more details, and for an understanding of the differences between these two datasets.

[13] Neither Dumont and Lemaître (2005) nor Docquier and Marfouk (2005) are able to distinguish between migrants who completed their formal education at home and those who studied abroad (while Beine *et al.*, 2007 estimate a model that is meant to adjust for this), and this further limits the possibility to use these data to make any inference about the extent – and the character – of brain drain from NMS.

[14] For instance, according to Dumont and Lemaître (2005), over 1.2 million Polish were living abroad in 2000, and an estimated 328,000 had completed tertiary education; leaving aside concerns about data quality, it has to be stressed that this reflects the whole Polish post-war migration history.

[15] The adjustment introduced by Beine *et al.* (2007) to correct for education acquired abroad does not significantly change the estimated emigration rate for highly educated migrants from NMS.

Table 1: Emigration rates from NMS, year 2000

	Level of qualification			
Country	Low	Medium	High	Total
Bulgaria	9.1	6.3	6.6	7.6
Czech Republic	4.2	1.9	10.4	3.7
Estonia	4.3	4.9	11.5	6.0
Latvia	1.8	2.6	8.8	3.5
Lithuania	6.2	3.6	8.6	5.6
Hungary	2.7	3.8	13.2	4.4
Poland	3.4	2.8	14.1	4.4
Romania	4.6	2.0	11.8	3.7
Slovenia	7.1	4.3	11.5	6.7
Slovakia	10.1	9.1	16.7	10.4

Notes: Docquier and Marfouk (2005) count as migrants all foreign-born individuals aged 25 and above who live in an OECD member country; a high level of qualificationcorresponds to at least to tertiary education, a medium level to secondary education.
Source: Docquier and Marfouk (2005)

The emigration rate is highest amongst highly skilled workers in all countries except Bulgaria. Table 2 shows estimates of the proportion of migrants in each skill category. Docquier and Marfouk (2005) estimate that the highly-educated between 16% and 51% of all migrants. Dumont and Lemaître (2005) estimate rather lower shares, between 15% and 37%.

Table 2: Selection rates of emigrants from NMS, year 2000

	Selection rate			
Country	Low	Medium	High	High
Bulgaria	52.8	30.8	16.4	14.5
Czech Republic	39.4	27.6	33.1	24.0
Estonia	32.0	27.9	40.1	32.0
Latvia	22.3	26.4	51.2	37.4
Lithuania	42.7	28.2	29.1	22.1
Hungary	31.7	29.2	39.1	28.7
Poland	30.0	30.4	39.5	25.7
Romania	34.5	34.2	31.3	26.3
Slovenia	47.1	26.8	26.1	17.5
Slovakia	37.9	42.2	20.0	13.8

Source: Docquier and Marfouk (2005); Dumont and Lamaître (2005)

As a complimentary data source we use the data from the EUROSTAT LFS conducted in the year 2006 in all the EU27 countries. We rely on the LFS conducted in the NMS to estimate the skill structure of the resident native population, to use it as a benchmark against which the corresponding composition of the migrant population from each country can be compared (see Table 3). For seven out of ten countries — the exceptions being Estonia, Lithuania and Slovenia — the share of highly skilled among migrants is

higher than the corresponding share among the resident population. With respect to medium skilled workers, the picture is more mixed, as for half of the countries medium skilled workers are overrepresented among the resident population, while for the other half the reverse occurs.

Table 3: Skill composition of native population and of emigrants from NMS to EU15 countries, year 2006

	Resident population, natives			Migrant population			Migrant population, age adjusted		
Country	low	medium	high	low	medium	high	low	medium	high
Bulgaria	31.3	50.8	17.9	24.0	48.5	30.2	24.2	45.9	29.1
Czech Republic	16.7	72.1	11.2	14.8	48.8	36.4	19.3	48.3	34.9
Estonia	22.7	49.8	27.5	35.8	49.4	14.8	26.8	43.1	19.2
Hungary	27.6	57.4	15.0	9.0	38.7	35.4	9.3	66.2	23.9
Lithuania	21.3	56.1	22.6	25.9	38.7	35.4	22.1	39.3	39.8
Latvia	25.4	56.8	17.8	-	-	-	-	-	-
Poland	21.3	64.1	14.7	26.1	48.2	25.7	21.5	47.6	26.8
Romania	33.0	57.5	9.6	33.2	53.3	13.5	33.2	53.1	13.6
Slovenia	23.4	58.8	17.8	34.4	59.2	6.4	33.2	60.0	6.6
Slovak Republic	19.2	69.1	11.7	18.2	62.6	19.2	17.3	63.3	21.3

Note: the age adjusted selection rates are computed applying the age distribution of the resident population to migrants' age-specific skill composition.

Source: Own Calculations based on Eurostat Labour Force Survey.

However, these comparisons are influenced by the possibly different age structure of the two groups. To assess the actual relevance of this confounding factor, the last three columns of Table 3 report the skill composition of the migrant population, computed as a weighted average of the skill composition within each one of three age brackets,[16] with weights given by the age structure of the resident population. Such an adjustment does not produce a major impact on the estimated skill composition, and the direction of the induced change in the share of highly skilled people is not constant across countries.

The absence of major changes is probably due to the fact that, as Table 4 shows, the share of the resident population in the younger age brackets is not necessarily lower than the corresponding share in the migrant population. The former is actually higher in Estonia, Hungary and Slovenia. In Slovenia the elderly are also over-represented among migrants.

[16] The three age brackets are 15 to 34, 35 to 49 and 50 to 64 respectively.

Table 4: Age structure of resident workforce and emigrant population from NMS, year 2006

	Resident population, natives			Migrant population		
Country	15-34	35-50	50-64	15-34	35-50	50-64
Bulgaria	28.6	43.3	28.1	40.1	49.6	10.3
Czech Republic	30.1	40.1	29.8	34.8	47.5	17.7
Estonia	35.4	40.0	24.6	29.8	63.3	6.9
Hungary	30.0	40.0	30.0	22.3	54.0	23.7
Lithuania	32.6	43.2	24.2	45.6	45.9	8.5
Latvia	33.0	41.4	25.6	53.8	41.1	5.1
Poland	33.6	39.7	26.6	43.5	46.0	10.5
Romania	33.6	41.3	25.0	42.0	50.7	7.3
Slovenia	29.5	43.2	27.4	25.9	40.4	33.6
Slovak Republic	34.5	40.8	24.8	54.2	38.9	7.0

Source: authors' elaboration on EUROSTAT, Labor force surveys

It is important to recall that LFS data, like the data used by Dumont and Lemaître (2005) and Docquier and Marfouk (2004), are stock data. So, for countries with a long-standing migration history, this data source does not necessarily provide an accurate picture of the characteristics of the recent migration process. Keeping in mind these limitations, a comparison of Table 3 with Table 2 shows that — with the exception of Bulgaria — the hare of highly skilled workers among migrants is lower than the corresponding figures from Dumont and Lemaître (2005) and Docquier and Marfouk (2004). Although such a comparison is only suggestive, given the differences across the datasets used, it is nevertheless possible that the claims about the size of skilled migration from the NMS might have been overstated.

Recently published OECD data does not cover the post-accession period. However it is possible to use this data to explore the duration of the migrant stock in each destination country. Table 5 presents the stock of immigrants born in NMS staying in the OECD countries around 2000 by education level and duration of stay.

Table 5: Stock of immigrants born in NMS in the OECD countries, by education level and duration of stay, around 2000

Country of residence	Total	Highly-skilled				
		Total	More than 10 years	5 to 10 years	Up to 5 years	Unknown
Australia	116,988	26,616	20,948	2,858	2,369	441
Austria	137,151	17,365	12,487	4,878	-	-
Belgium	35,866	8,097	4,136	1,495	2,464	2
Canada	359,725	138,980	92,370	24,855	19,835	1,920
Czech Republic	112,337	6,528	6,528	-	-	-
Denmark	19,068	4,809	3,228	662	919	-
Finland	2,211	n.a.	n.a.	n.a.	n.a.	n.a.
France	159,333	39,269	20,589	6,495	6,400	5,785
Germany	1,546,414	269,998	254,080	15,918	0	0
Greece	81,863	11,610	1,180	1,942	4,347	4,141
Hungary	70,846	8,750	6,542	2,208	-	-
Ireland	13,281	3,528	147	210	1,896	1,275
Italy	149,430	19,315	3,509	3,433	5,854	6,519
Luxembourg	2,225	637	149	92	373	23
Netherlands	5,012	n.a.	n.a.	n.a.	n.a.	n.a.
New Zealand	5,301	1,527	747	309	432	39
Norway	13,170	3,632	2,606	582	444	-
Spain	98,260	16,200	4,520	1,880	9,800	-
Sweden	78,985	24,730	17,555	2,190	3,895	1,090
Switzerland	58,247	28,235	5,012	1,349	6,957	14,917
United Kingdom	51,008	n.a.	n.a.	n.a.	n.a.	n.a.
United States	849,339	272,959	177,089	46,493	49,377	-
OECD - Total	3,966,060	902,785	633,422	117,849	115,362	36,152

Note: NMS include Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia,
Source: OECD database, based on national population censuses and LFSs

From Table 5 it follows that, on average, around 70% of highly skilled migrants from the NMS had been abroad for more than 10 years. Thus, as suggested before, the problem with the stock data is that migration rates derived from them is a cumulative effect of long-lasting migration process and should not be used (directly) to analyze recent migratory phenomena.

Table 6: Stock of immigrants born in Poland in the OECD countries, by education level and duration of stay, around 2000

Country of residence	Total	Highly-skilled				
		Total	More than 10 years	5 to 10 years	Up to 5 years	Unknown
Australia	56,292	13,706	11,313	1,500	663	230
Austria	31,642	5,254	3,370	1,884	n.a.	n.a.
Belgium	18,880	3,153	1,779	542	831	1
Canada	177,525	61,455	45,360	12,635	2,935	525
Czech Republic	15,519	n.a.	n.a.	n.a.	n.a.	n.a.
Denmark	10,247	2,738	2,185	315	238	-
France	103,829	18,130	10,922	2,225	2,121	2,862
Germany	1,021,656	168,777	155,647	13,130	n.a.	n.a.
Greece	14,547	2,413	393	615	476	929
Ireland	1,956	624	66	42	351	165
Italy	31,413	5,423	1,314	1,087	1,355	1,667
Luxembourg	931	253	51	37	161	4
Netherlands	5,012	n.a.	n.a.	n.a.	n.a.	n.a.
New Zealand	1,851	483	297	84	96	6
Norway	6,578	1,986	1,601	233	152	-
Spain	15,600	3,440	1,580	760	1,100	-
Sweden	36,530	11,120	8,775	845	1,445	55
Switzerland	10,814	6,182	1,840	404	1,401	2,537
United Kingdom	39,618	n.a.	n.a.	n.a.	n.a.	n.a.
United States	452,005	119,465	80,008	23,935	15,522	-
OECD - Total	2,052,445	424,602	326,501	60,273	28,847	8,981

Source: OECD database, based on national population censuses and LFSs

Table 6 repeats the analysis for Polish migrants only. It is worth noting that the provided numbers seem to be quite reliable. In 2000, over 425,000 highly-skilled people born in Poland were registered abroad. However, of these, over 327,000 had stayed abroad for longer than 10 years, compared to only 60,000 between five and 10 years and only 29,000 for less than five years. Interestingly, there are significant differences observed between destination countries. In Germany, for example, more than 90% of all Polish highly skilled migrants had lived there for more than 10 years. But in the 'new' destinations (Spain, Italy, Ireland) the share of long-term migrants was less than 25%. Last but not least, according to this OECD data, Poles constituted around 50% of all highly skilled migrants originating from the NMS.

5 Contextual issues

In this section we provide the context for the recent migration of high-skilled workers, including basic data on the demographic and educational structures in the NMS and the position of high-skilled workers in labour market in the origin countries. From Deliverable 2 it is clear that the populations of the NMS are relatively young compared to the populations in the EU15 countries. This is reflected, for example, in the share of persons aged 15-34, which is significantly higher in the NMS than the EU25 average. This is particularly the case in three countries: Poland, Romania and Slovakia. It is important to note that those aged 15-34 are, on average, the most geographically mobile and also

most likely to be actively participating in the learning process. Thus, analysis of demographic data reveals, firstly, a relatively high migratory potential, but also, secondly, may suggest that the structure of educational attainment can differ between the NMS and the EU15 countries.

Table 7 shows the percentage of the population aged 25 to 64 having completed at least upper secondary education. According to the data the NMS can be described as having high levels of human capital relative to EU15 countries. This is particularly the case for the NMS8 countries, and especially in the Czech Republic, Poland and the Baltic States. Bulgaria and Romania (NMS2) have lower levels of human capital, but still have higher levels than the average in the EU15.

Table 7: Percentage of the population aged 25 to 64 having completed at least upper secondary education, 2000-2007

Country	2000	2001	2002	2003	2004	2005	2006	2007
EU15	61.5	61.5	62.4	63.9	65.2	66.2	66.7	67.5
NMS10	79.4	79.7	80.7	82.1	83.1	84.2	:	:
Bulgaria	67.5	71	71.6	71.2	71.7	72.5	75.5	77.4
Czech Republic	86.1	86.3	87.9	88.5	89.1	89.9	90.3	90.5
Estonia	86.1	87.1	87.6	88.5	88.9	89.1	88.5	89.1
Latvia	83.2	79.6	82.2	83.2	84.6	84.5	84.5	85.0
Lithuania	84.2	84.2	84.9	86.1	86.6	87.6	88.3	88.9
Hungary	69.4	70.0	71.4	74.1	75.3	76.4	78.1	79.2
Poland	79.9	80.2	80.9	82.3	83.6	84.8	85.8	86.3
Romania	69.3	70.6	71.1	70.5	71.5	73.1	74.2	75.0
Slovenia	75.3	75.8	77.0	78.1	79.7	80.3	81.6	81.8
Slovakia	83.8	85.1	86.0	86.7	87.0	87.9	88.8	89.1

Source: Own elaboration based on EUROSTAT data

Table 8 refers to students at the tertiary level, and shows the trends in the number of students between 2000 and 2006. The data reveal that, leading up to accession, most of the NMS experienced a significant (and in some cases enormous) increase in the numbers of students. In the EU25 as a whole the average number of students in 2006 was around 16% higher than in 2000. In the case of the NMS the ratio was much higher (with the exception of Bulgaria). The largest increases in number of students were in Romania (85% increase), Lithuania (63%), Slovakia (46%), and Poland (36%). Such an enormous increase raises the question of the quality of the tertiary education and obviously, this is an issue that needs closer attention in future analyses.

Table 8: Trends in the number of students (ISCED 5-6)[17], EU25 and NMS, 2000=100

Country	2000	2001	2002	2003	2004	2005	2006
EU25	100.00	103.49	107.38	111.05	113.89	115.43	116.42
Bulgaria	100.00	94.53	87.41	88.21	87.45	91.04	93.19
Czech Republic	100.00	102.48	112.14	113.13	125.70	132.56	132.99
Estonia	100.00	107.84	113.06	118.66	122.57	126.49	127.43
Latvia	100.00	112.72	121.16	130.37	140.02	143.31	143.75
Lithuania	100.00	111.48	122.07	137.49	149.88	160.30	163.17
Hungary	100.00	107.62	115.40	127.16	137.48	141.97	142.85
Poland	100.00	112.37	120.68	125.56	129.42	134.09	135.84
Romania	100.00	117.81	128.63	142.27	151.50	163.23	184.49
Slovenia	100.00	109.19	118.38	121.12	124.58	133.89	136.99
Slovakia	100.00	105.89	111.99	116.34	121.19	133.48	145.62

Source: Own elaboration based on EUROSTAT data

Table 9 shows that, in more than half of the NMS, the share of students in the population aged 15-29 is higher than the EU25 average. The share of students is particularly high in Estonia, Lithuania, Latvia and Poland. The highest increases were noted directly before the EU-enlargement.

[17] The International Standard Classification of Education (ISCED) is commonly used in order to compare on education data between countries. In the context of this report four ISCED levels are of special importance: level 3 - (upper) secondary education, level 4 - post-secondary non-tertiary education, level 5 - first stage of tertiary education, level 6 - second stage of tertiary education.

Table 9: Percentage of students (ISCED level 5 and 6, tertiary and post-tertiary) among the population aged 18-24, EU countries

Country	1998	1999	2000	2001	2002	2003	2004	2005
New member states								
Bulgaria	22.4	23.1	23.1	21.6	21.2	21.9	21.9	23.3
Cyprus		13.6	12.3	13.8	15.8	19.5	20.9	18.0
Czech Republic	13.7	14.9	17.1	17.4	19.0	19.6	21.9	23.2
Estonia	25.3	28.2	28.7	28.9	28.5	28.4	28.5	28.7
Hungary	15.5	17.6	19.2	20.0	22.0	24.3	26.3	27.5
Latvia	22.6	25.1	24.1	26.1	27.9	29.0	29.9	29.5
Lithuania	23.6	25.7	28.2	30.1	31.1	33.0	34.1	35.2
Malta		11.3	11.8	13.1	13.3	15.0	13.9	16.4
Poland	19.4	22.1	24.5	27.2	28.9	30.0	30.9	32.5
Romania	10.8	12.2	13.9	16.6	19.5	20.5	21.5	22.6
Slovak Republic			17.0	17.8	18.6	18.9	18.8	20.3
Slovenia	25.0	27.9	29.2	31.2	33.8	34.9	35.7	38.1
EU15								
Austria	17.6	18.0	17.0	17.5	16.7	17.3	18.0	18.4
Belgium		32.9	32.8	32.6	32.9	33.1	33.5	33.7
Denmark	16.5	17.1	17.8	18.4	19.1	19.7	20.2	20.7
Finland	28.1	28.9	29.6	29.9	29.8	31.2	31.5	31.8
France	29.3	29.5	29.7	29.7	29.3	29.5	29.7	29.9
Germany	14.4	14.6	14.8	15.2	15.9	16.6	17.5	17.7
Greece	29.9	31.8	34.7	33.3	37.3	40.3	44.4	44.5
Ireland	24.6	24.7	25.7	26.2	27.0	27.1	27.9	27.2
Italy	23.1	22.3	22.1	22.8	23.9	25.6	26.8	27.5
Luxembourg								
Netherlands	23.9	24.8	25.8	26.2	26.5	26.7	27.4	28.3
Portugal	21.3	22.3	23.2	24.9	24.6	25.1	25.3	25.0
Spain	27.9	29.0	30.4	30.4	30.3	30.3	30.3	29.7
Sweden	17.6	20.4	21.1	21.5	22.6	23.6	24.2	24.0
United Kingdom	21.3	22.5	22.3	22.7	23.4	22.9	22.3	22.3

Source: Eurostat, own elaboration

Of course, the fact that there has been an increase in educational investments does not necessarily mean that the labour market situation is improving.[18] In at least three countries among the NMS (Bulgaria, Poland and Slovakia) there were severe labour market disequilibria observed in the pre-enlargement period. However, in most cases since 2003 the unemployment rate has fallen, and as of 2007 only in Poland and Slovakia were unemployment rates higher than the EU15 average. These developments are, at least to some extent, likely to be linked to post-accession labour mobility.

[18] In contrary, in many CEE countries, education at tertiary level tends to be perceived as an 'escape from unemployment' and thus may reflect negative changes on the domestic labour market.

Table 10: Unemployment rates in the NMS10, percent, for persons with upper secondary and post-secondary non-tertiary education – levels 3-4 and with tertiary education – levels 5-6 (ISCED 1997), 2000-2007 (2nd quarter)

	Levels 3-4						Levels 5-6					
	2000	**2002**	**2004**	**2005**	**2006**	**2007**	**2000**	**2002**	**2004**	**2005**	**2006**	**2007**
EU15	**7.9**	**7.4**	**8.1**	**7.9**	**7.4**	**6.5**	**4.9**	**4.6**	**5.1**	**4.8**	**4.5**	**3.9**
NMS10	14.1	15.5	14.9	14.1	11.3	8.2	5.1	4.9	5.5	5.0	4.1	3.2
Bulgaria	15.8	17.7	11.3	9.1	7.7	5.6	6.7	8.2	5.8	4.2	3.8	2.7
Czech Rep.	7.9	6.4	7.5	7.1	6.3	4.7	3.0	1.8	2.1	2.1	2.5	1.3
Estonia	14.8	10.3	10.7	10.1	6.2	5.3	5.0	4.7	6.0	3.2	4.1	3.2
Latvia	14.9	13.0	10.6	8.9	6.0	5.4	7.4	6.6	3.6	3.9	2.7	3.1
Lithuania	20.3	14.6	12.8	9.7	6.5	4.6	9.4	6.8	6.7	3.8	2.4	2.1
Hungary	6.5	5.1	5.4	6.9	6.6	6.3	1.4	1.8	2.2	2.5	2.6	2.5
Poland	17.1	21.2	20.4	19.4	15.2	10.5	5.4	6.6	7.3	6.8	5.5	3.8
Romania	9.5	10.0	8.4	8.2	7.7	7.1	3.6	4.1	3.1	3.3	3.1	2.8
Slovenia	7.0	6.1	6.1	6.0	6.5	4.7	2.2	2.5	2.8	3.1	3.0	2.8
Slovakia	18.4	17.8	17.0	14.4	12.1	9.4	5.2	3.9	5.9	5.2	3.0	4.2

Source: Own elaboration based on EUROSTAT data

The left hand panel of Table 10 shows that in most cases the unemployment rate for those with upper secondary and non-tertiary education (ISCED 3-4) fell between 2000 and 2004 towards the EU15 average. Poland and Slovakia were exceptions, with significantly higher unemployment rates. The right hand panel of Table 10 shows equivalent unemployment rates for those with tertiary education. In the post-accession period Poland was the only country among the NMS with relatively high unemployment rate of the well educated, which suggests that there may be problems in absorbing the large numbers of highly educated workers. Once again, this suggests that Poland should be characterised as a country experiencing brain overflow" rather than "brain drain".

Table 11: Unemployment rates in the NMS10, percent, for persons aged 15-24 with upper secondary and post-secondary non-tertiary education – levels 3-4 (ISCED 1997), 2000-2007 (2nd quarter)

	2000	2001	2002	2003	2004	2005	2006	2007
EU15	**14.1**	**12.0**	**12.5**	**13.1**	**13.6**	**13.6**	**12.9**	**11.9**
NMS10	27.3	30.6	31.4	31.9	31.2	29.8	23.2	16.3
Bulgaria	30.4	33.3	31.0	23.0	19.7	17.7	16.3	9.8
Czech Rep.	14.1	13.2	13.0	13.9	16.7	15.3	13.8	8.1
Estonia	17.3	21.8	.	23.4	18.5	21.8	.	.
Latvia	17.9	19.2	21.1	14.5	18.4	13.4	11.6	6.7
Lithuania	26.2	30.5	18.5	26.9	23.0	20.3	.	7.2
Hungary	11.0	9.4	10.0	10.5	12.0	16.6	13.7	14.2
Poland	35.7	39.9	42.2	42.9	40.6	39.0	29.9	21.3
Romania	22.0	21.0	25.0	22.8	24.0	21.7	19.9	19.8
Slovenia	14.5	13.4	12.4	13.8	13.2	12.7	14.5	6.4
Slovakia	35.0	36.6	35.6	30.6	28.6	23.5	21.3	13.5

Source: Own elaboration based on EUROSTAT data

Table 10 referred to the whole working-age population. As noted, however, the most dynamic changes with regard to education were in the youngest age groups. Table 11 shows that the labour market situation of young people in the NMS was relatively poor, particularly in the pre-accession period. This is true not only for poorly-skilled individuals, but also to those persons with upper secondary and post-secondary (non-tertiary) education, particularly in case of Poland and Romania.

Table 12: Unemployment rates in the NMS10, percent, for persons aged 15-39 with tertiary education - levels 5-6 (ISCED 1997), 2000-2007 (2nd quarter)*

	2000	2001	2002	2003	2004	2005	2006	2007
EU15	**6.1**	**5.3**	**6.0**	**6.1**	**6.3**	**6.3**	**5.7**	**5.1**
Bulgaria	7.9	9.5	10.3	8.6	7.4	5.2	4.5	2.8
Czech Rep.	3.8	4.0	2.3	3.2	2.3	2.9	3.0	2.0
Estonia	.	8.8	.	.	8.3	.	.	.
Latvia	7.6	.	7.7	4.5	.	4.1	.	3.5
Lithuania	11	8.4	8.3	5.6	7.2	4.7	.	2.4
Hungary	2.0	1.4	2.5	1.8	3.1	3.6	3.9	4.1
Poland	7.7	9.0	9.4	9.7	10.1	9.6	7.9	6.1
Romania	5.6	5.5	5.3	4.4	4.7	5.8	5.6	3.9
Slovenia	3.2	2.8	3.9	4.9	4.0	4.6	4.9	4.6
Slovakia	7.3	8.0	5.2	5.9	8.4	6.3	4.4	5.8

* if available

Source: Own elaboration based on EUROSTAT data

Table 12 refers to unemployment rates of persons aged 15-39 who completed education at the tertiary level. It can be seen that in at least two cases (Poland and Slovakia) highly-educated young people still face serious problems on the domestic labour market. The most difficult situation is in Poland, where the unemployment rate among those who

achieved tertiary education was much higher than the EU15 average. To conclude, it is necessary to consider the following factors that may have a profound effect on the extent and the consequences of high-skilled migration from the NMS:

- The NMS populations are generally younger than populations of the 'old' Europe, particularly in the cases of Poland, Romania and Slovakia. We would expect these countries to have high migratory potential.
- The NMS populations are relatively well educated (in some cases much better than the EU15 countries). This situation is, to some extent, the consequence of communist past (which may raise the question on the quality of education obtained) but mainly the outcome of the 'educational breakthrough' as observed in the 1990s and 2000s (particularly in Romania, Lithuania, Slovakia, and Poland).

Consequently, a key point in the analysis of migration is the demographic and educational structure of sending populations. The data presented in this section shows a marked increase in enrolment in tertiary and post-tertiary education in most NMS between 1998 and 2005, a time when the corresponding figures in EU15 countries remained roughly constant, or at least fell short of matching the NMS increase. This suggests that the recent substantial increase in the supply of highly skilled workers could more than offset any drain of skilled workers from NMS, even if one cannot attribute the observed increase in enrolment rates to the migration pattern from these countries. Nevertheless, even though the causal relationship might be weak, it is true that the figures provided in this section contribute to further reduce possible concerns about a detrimental effect of skilled migration from these countries.[19]

In many cases the labour market position of young people in the NMS who obtained tertiary education is actually more favourable than in the EU15, although there are important exceptions, such as Poland. This casts some doubts on the migratory potential of this group. On the other hand — and this is of great importance in the context of this report — the data suggest that, in the case of Poland, the outflow of well-educated individuals can be seen as "brain overflow" rather than a "brain drain". This question will be the subject of more in-depth analysis in the next section which analyses the impacts of high-skilled mobility on sending countries.

6 High-skilled mobility and its impact on sending countries

The main aim of this section is to provide an in-depth analysis of high-skilled mobility and its consequences. The scope of the analysis depends partly data availability, and as a result most attention will be paid to Poland, a country which sends the largest numbers of migrants abroad, but also offers migration data of relatively high reliability. The departure point will be an overview of recent trends in international mobility and stylized

[19] As suggested by the analysis of skill specific unemployment rates for young workers in NMS provided above.

facts on the migration of the highly skilled. Against this background a selectivity analysis will be provided for both the pre- and post-accession periods. We focus in particular on the effects of the EU enlargement and the introduction of the Transitional Arrangements, and on the structural patterns of mobility from the NMS and the consequences of the outflow on the sending countries.

6.1 Poland – recent migration and mobility of the highly skilled

Poland is the most important migrant sending countries among the NMS, with significant migration flows recorded since the early 1970s. In the 1980s the number of long-term migrants amounted to between 1.1 and 1.3 million people, about 3% of the total population. In addition, more than 1 million people spent more than three but less than 12 months abroad (Kaczmarczyk and Okólski, 2002). National census data from 1988 indicated that around 900,000 permanent citizens of Poland (approximately 2% of the total population) resided abroad on a temporary basis. Most of the data available suggest that, in the very first phase of transition, the international mobility of Poles declined. Data from the LFS data indicate a significant decline in the scale of migration between 1994 and 1998 (from over 200,000 to 150,000 people staying abroad every quarter). However, since the late 1990s, migration from Poland has been on the rise again. The 2002 National Census indicated that around 790,000 Polish citizens (1.8% of the total population) were staying abroad. Generally, prior to the EU enlargement, Poland was one of the most important European migrant sending countries, with significant numbers of its citizens employed in Germany (with seasonal migration playing an important role — around 250,000 people a year in the early 2000s), the United States of America and southern European countries (Italy, Spain).

The recent estimates provided by the Polish Central Statistical Office constitute the most reliable data set made available thus far (see Table 13).[20]

[20] For more details see the Polish Country Study in this project.

Table 13: Polish citizens staying abroad for longer than 2 months by destination country, estimates (000s)

Destination	May 2002	End of 2004	End of 2006	End of 2007
Total	786	1000	1950	2270
European Union	451	750	1550	1860
Austria	11	15	34	39
Belgium	14	13	28	31
France	21	30	49	55
Germany	294	385	450	490
Ireland	2	15	120	200
Italy	39	59	85	87
Netherlands	10	23	55	98
Spain	14	26	44	80
Sweden	6	11	25	27
United Kingdom	24	150	580	690

Source: Central Statistical Office (2008).

As is shown in Table 13, the stock of migrants from Poland more than doubled since EU enlargement. Over 80% of Polish migrants in 2007 were residents of other EU countries compared to 57% in 2002, while the most important destination country became the United Kingdom, with 30% of the total. Germany — the most favourable destination country for Polish migrants in the pre-accession phase — received 'only' 22% of the outflow. Notable increases were also observed in Ireland, the Netherlands and Sweden.

The massive post-accession migration of Poles is confirmed by data obtained from major destination countries, particularly from the UK, which became the most attractive destination country for Polish migrants after May 2004. According to the International Passenger Survey in 2006 the number of visitors from Poland was 4.8 times higher than it was in 2003, exceeding 1.6 million.[21] From Worker Registration Scheme data, over 500,000 Poles registered with the system up until September 2007. The inflow was particularly high in 2005 and 2006, and only began diminishing in 2007. Beginning in the fiscal year 2003/2004 Polish citizens appeared among the top ten countries of origin of incoming migrants that were allocated a National Insurance number. The total number of National Insurance Numbers allocated to Poles between 2003 and 2007 amounted to around 470,000. Poles thus constitute the most important migrant group, accountable for over 30 percent of the total inflow of foreigners to the insurance system.

The data presented above is also supported by the UK LFS data, which indicates that between early 2006 and early 2007 the number of Poles residing in the UK increased from 209,000 to 406,000 (Kaczmarczyk and Okólski, 2008).

With regard to the composition of the migrating population, post-accession migration from Poland can be expressed both in terms of continuity and change. The most important aspect of continuity is the predominance of labour migration. According to the

[21] Note that this data refers not to migration per se but rather depicts the scale of and trends in mobility, including tourism.

LFS around 80% of migrants take up employment while staying abroad. The prevalence of short-term mobility also remains more or less stable. In the first half of 2000, a significant proportion of all temporary migrants (over 60%) stayed abroad for less than twelve months. However, a long-term mobility trend also began to emerge after EU enlargement. For example, the proportion of short-term migrants in the total number of migrants decreased from 63% in 2005 to 54% in the second quarter of 2007 (Kępińska, 2007). This suggests that Polish migrants are prolonging their stays abroad.

One of the most prominent changes in the structure of Poles' post-accession mobility refers to destination countries (see Table 14). However, according to available data, recent migration from Poland is not best understood in terms of a particular concentration in selected countries (i.e., mostly in the UK and Ireland) but rather as a gradual 'spilling over'. In fact, Polish citizens are targeting almost all EU/EEA countries and have become increasingly active contributors to their labour markets. The widening range of destination countries for Poles is not the only element changing. In general, recent Polish migration is more regular than irregular (that is, more frequently legal than clandestine), more of a long-term duration than circular, and more individualistic than related (subordinated) to household strategies (Kaczmarczyk and Okólski, 2008).

Traditionally, a considerable part of Polish migration was ascribed to the mobility of the highly skilled. However, this thesis seems to be rather questionable with reference to almost the whole post-war period. With the exception of an episode of (partially) forced and politically motivated migration of persons of Jewish descent (1968-1971), when over 13,000 mostly highly educated persons left Poland, the share of persons with tertiary education among all migrants did not differ significantly from that of the total population.[22] The situation changed in the late 1970s and 1980s. The overrepresentation of the highly skilled is particularly true in the case of the massive outflow in the 1980s. Calculations based on the policy register's data show that of almost 700,000 emigrants who left Poland between April 1st, 1981 and December 6th, 1988, 15% had a higher degree and 31% had secondary education. If we consider that for the whole population the share of university graduates was approximately 7%, the data show that there was a considerable overrepresentation of the highly educated amongst emigrants (Sakson, 2002). According to estimates of Okólski (1997), the scale of the emigration of high-class specialists in the 1980s was so large that the number of emigrants in this category each year (15,000) constituted approximately a quarter of Polish university graduates of all higher education institutions.

As follows from various data sources, the situation has changed much during transformation. According to the official data, since 1990 the share of individuals with the lowest level of education amongst migrants has been increasing, while the share of individuals with the highest level of educational attainment has been decreasing. At the threshold of transformation in 1988, 37% of migrants aged 15 or above had an

[22] In case of emigrating Poles of Jewish descent this share was over eight times higher than in the total population.

elementary or lower than elementary education, compared to 9% of migrants who had a higher degree. In 2003, there were 55% in the former group, and 4% in the latter. These observations were proved by the majority of studies conducted both in Poland and in the receiving countries.[23]

Table 14: Permanent residents of Poland (aged 15 and above) living abroad for more than one year (as of May 15, 2002), of which those with at least university diploma, by country of destination (actual residence) and year of departure

		Country of residence						
Year of departure	Total	Germany	Italy	UK	other U15	U.S.	Canada	Other
Total	x	39.0	4.2	2.4	10.1	21.8	4.2	18.3
of which those with university diploma	14.0	20.6	3.1	6.0	12.9	26.8	7.1	23.5
1988 and before	15.6	21.8	2.1	3.2	12.4	24.3	13.2	22.9
1989-1991	11.8	26.2	2.0	2.5	10.8	28.4	10.7	19.4
1992-1994	13.4	17.7	3.1	4.2	13.8	32.0	7.9	21.2
1995-1997	13.4	19.2	3.7	6.4	13.7	29.4	4.9	22.6
1998-2001	15.2	19.4	3.8	9.8	13.6	25.8	3.2	24.2

Source: Kaczmarczyk and Okólski, 2005.

According to the Polish census of 2002, among 576,000 permanent residents aged 15 or more years who at the census date lived abroad for at least 12 months,[24] 0.7% held a doctor's degree, 10.1% a university diploma and 3.2% other tertiary education diploma. Respective shares for the general population were 0.3%, 7.4% and 2.7%. Altogether the education of migrants was much better than actual residents (14.0% vs. 10.4%). As can be seen in Table 14, the share of highly educated migrants was the highest among those who left Poland before the onset of transition (15.6%), became rather low among those who emigrated in 1989-1991 (11.8%), and rose among those leaving in the following years.

For obvious reasons the population census cannot serve as a source of information on the most recent emigration from Poland. Another source of information about emigration from Poland, namely the population register, reflects only a very small part of the total outflow.[25] It reveals that during the 1990s the percentage of highly skilled persons among emigrants was very low, approximately 2% (Figure 1). Since 2004 this share started to increase very rapidly, to reach in 2005 8% for men and 11% for women. No

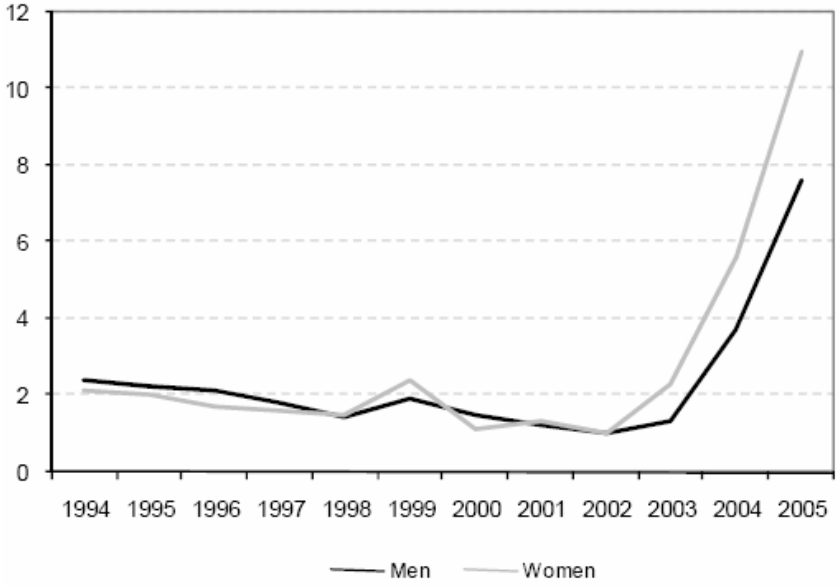
[23] CMR research in the years 1994-1999 indicated that the claim about the brain drain can be upheld only in relation to big urban centers. More importantly in quantitative terms, migration from the peripheral regions was dominated by individuals with no more than secondary educational attainment, of poor human capital, taking up employment almost exclusively in the secondary sectors of labour markets in the host countries. Similar results were provided by studies conducted both in Poland and in the receiving countries. Each of these studies supported the observation that a greater propensity to migrate was typical for people with low cultural competencies and no knowledge of foreign languages who encountered problems with finding their feet in the new post-communist reality, particularly on the labour market. These people were almost fully dependent on the employment offer addressed to unskilled workers, willing to start work any time and for any period of time (usually on an extremely short-term basis). Exceptions to the case — such as Ireland or the Scandinavian countries — only confirmed the general rule (Kaczmarczyk and Okólski, 2005).

[24] That was 1.8% of the total number of permanent residents of Poland aged 15 or more years.

[25] Mainly due to definition of migrant applied. According to the official data emigrant from Poland is a person who left with an intention to settle abroad and de-listed her-/himself from the place of permanent residence in Poland.

data for subsequent years is available as since 2006 the information about education level of emigrants ceased to be collected in the population register system.

Figure 1: The share of emigrants with post-secondary level of education on all registered emigrants by sex, in percent, 1994-2005



Source: population register, after Okólski (1997-2001), Okólski and Kępińska (2002), Kępińska (2003-2007), Recent trends in international migration – OECD Sopemi report for Poland, various years.

The re-emergence of the highly skilled outflow from Poland and the increase in its scale since the EU enlargement is also reflected by the Labour Force Survey, which remains the most comprehensive data source on the educational structure of Polish emigrants. According to the CMR Migrants' Database based on the Polish LFS,[26] the pre-accession outflow from Poland was dominated by people with secondary vocational and vocational education (61% of migrants, Table 16). After 2004 the share of University graduates increased significantly: from 15% to 20%, which in comparison to 14% of University graduates in the overall population of Poland (in 2004) is the sign of high selectivity of migration with respect to education (see Section 5.2). In particular, this is the case among female migrants, out of whom 27% were highly-skilled persons.

However, as we already argued in Section 1, this picture may be misleading without an assessment of the structure of the Polish population. In the last twenty years, Poland experienced a true educational breakthrough (see Section 4). Between 1970 and 2001, the share of university graduates among the Polish population increased from 2% to 12%. At the end of the 1990s, the number of students was 2.6 times higher than in 1990. Nowadays in Poland there are over 1.8 million students, and data from the Central Statistical Office shows that in the early 2000s the gross enrolment ratio (the rate of all studying to the whole population) in the age group 19-24 was over 30% (see section 4), which means that as far as the universality of higher education is concerned, Poland has

[26] See below for details on the construction of the dataset.

almost reached the standards of the EU15. If we take into consideration that a higher propensity to migrate is typically a feature of relatively young persons (aged 18 to 35), the recent increase in the highly skilled migration is a natural phenomenon and reflects changes in the demographic and educational structure of sending population and migrant group.

Table 16: The education structure of Polish pre- and post-accession migrants by sex, in per cent

	Pre-accession			Post-accession		
Level of education	Total	Men	Women	Total	Men	Women
University degree	14.7	12.0	18.3	19.8	15.6	27.0
Secondary	14.0	7.1	23.1	14.2	8.8	23.8
Secondary vocational	26.1	26.0	26.3	28.1	29.8	25.1
Vocational	34.8	45.4	20.9	30.9	39.2	16.2
Primary	9.9	9.3	10.9	7.0	6.6	7.8
Unfinished	0.4	0.2	0.5	0.0	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

Notes: Pre-accession migrants - aged 15 and over who have been abroad for at least 2 months in the period 1999-2003; post-accession migrants - in the period may 2004 - December 2006; University degree - including bachelor, master and Ph.D. degree.
Source: CMR Migrants' Database, based on the Polish LFS.

6.2 Selectivity of the recent outflow from Poland

Poland's accession to the EU was expected to affect the migration patterns of the Polish population in many ways. Below we will present an account of the scale and diversity of those influences by comparing migrant characteristics of the immediate pre- and post-accession period.

The analysis will be based on two migrant databases extracted from Polish LFS. Due to limited number of migrant cases in the samples a dedicated data set was created. This data set consists of two sub-sets. The first one includes all residents of Poland aged 15 or above who, at the time of the survey, resided in a foreign country for longer than two months (hereafter referred to as "temporary migrants"). The second one includes those temporary migrants whose stay abroad did not exceed one year (hereafter, "short-time temporary migrants").[27]

All migrants in the databases were divided into two groups according to the time of their departure from Poland: those who left between the 1st quarter of 1999 and the 1st quarter

[27] The number of migrants in the first database was 6,693. In the second database 3,700, which allows us to provide various structural breakdowns at both the country and regional level.

of 2004 ("pre-accession migrants") and between the 1st quarter of 2005 and the 4th quarter of 2006 ("post-accession migrants").[28]

Table 17 shows that the accession seemed to have a significant impact on the geography of outflow. The top 3 countries of the pre-accession period — those that accounted for almost two-thirds of the total outflow — lost their predominance in the post-accession period, replaced by three countries whose importance before May 1st, 2004 was moderate or very low. The former three countries consisted of destinations known for extensive and well-developed (and in the case of a few destination countries, long-lasting) networks of Polish migrants, whereas the latter three happened to be the only EU countries which on May 1st 2004 did not introduce restrictions to the access of Polish migrants to their labour markets. It is worth noting that the shift in the geography of outflows was more marked in the population of short-term than long-term migrants.

Table 17: All and short-term temporary migrants from Poland sorted by major groups of destination countries before and after EU accession

Group of countries	All migrants		Of which short-term migrants	
	before	after	before	after
Countries granting Polish citizens a free access to labour market after May 1st, 2004*	12.1	42.2	10.3	46.5
(of which the United Kingdom)	(9.7)	(31.3)	(8.2)	(34.4)
Top-3 countries of the pre-accession period**	62.9	36.1	63.7	34.8
(of which Germany)	(31.9)	(18.8)	(38.2)	(20.4)
Countries whose share in the total outflow was at least 3 percent in any period***	12.7	11.0	13.9	9.5
Other countries	12.3	10.7	12.1	9.2

Notes:* United Kingdom, Ireland, Sweden, ** Germany, USA, Italy, ***France, Spain, Belgium, the Netherlands
Source: Kaczmarczyk and Okólski 2008.

The data strongly support a hypothesis of a shift from predominantly network-driven to predominantly labour demand-driven migration. This hypothesis can also be supported by the analysis of the distribution of migrants, sorted by their region of residence prior to migration, in the period before May 1st 2004, with that which occurs in the period after May 1st 2004. It can be concluded that the post-accession migrants were more evenly distributed across regions than were the pre-accession migrants. Temporary migration became more readily accessible to people across Poland, which seems consistent with the hypothesis that stresses the role of demand as an impetus for outflow. Additionally, as shown in the Polish country study (within this research project) recent changes in the

[28] For methodological reasons, migrants recorded between the 2nd quarter of 2004 and the 4th quarter of 2004 were not included in the databases.

ranking of destination countries is to be linked to institutional changes (particularly, the introduction of Transitional Arrangements).

One of the most striking tendencies within migrant selectivity was a change with respect to education levels. A predominant part of Poland's population aged 15+ comprises (as of mid-2004) persons with educations below secondary levels, where only 12% have university diplomas (or their equivalent). Before the accession no selectivity effect was observed among people with post-secondary education, while those with vocational education, being by far the largest group among migrants, exhibited a moderate positive selectivity. After the accession, the selectivity index value (*SI*)[29] remained almost unchanged in the latter group and became much higher in the former group. Generally, post-accession Polish migrants are definitely positively selected with respect to education.

Table 18: Migrant selectivity indexes (*SI*) for post-secondary and vocational education before and after EU accession (all migrants), by selected countries of destination

Educational level/ country of destination	Before accession	After accession
All countries		
Post-secondary	0.02	0.42
Vocational	0.34	0.30
United Kingdom		
Post-secondary	1.09	1.13
Vocational	0.07	0.11
Germany		
Post-secondary	-0.29	-0.52
Vocational	0.51	0.57

Source: Kaczmarczyk and Okólski 2008.

Three categories of educational attainment encountered a pretty similar loss, namely around 4%. Those were: tertiary (university diploma or equivalent[30]), other post-secondary and secondary completed[31], and vocational.[32] In the group with education levels lower than vocational the loss was merely 1%. There were, however, considerable differences between males and females. Males with post-secondary (other than tertiary) and secondary education suffered the largest loss (5.8%), followed by those with

[29] The migrant selectivity index is illustrated by the following formula: $SI_{V=i} = \frac{\frac{M_{V=i}}{M} - \frac{P_{V=i}}{P}}{\frac{P_{V=i}}{P}}$

where: $SI_{V=i}$ – index for category *i* of variable *V*; $M_{V=i}$ and $P_{V=i}$ – number of migrants and number of people in the general population, respectively, falling into category (or value) *i* of variable *V*, and *M* and *P* – overall number of migrants and people in the general population, respectively. The selectivity of outflow takes place if the index assumes a non-zero value for any category (value) of a given variable. A positive *SI* value means that migrants falling into a specific category (variable) of a given variable are relatively more numerous than people in the general population with the same characteristics, whereas a negative *SI* value (but equal to or higher than -1) means the opposite. The higher the positive value or the lower the negative value of *SI*, the stronger the selectivity.

[30] (Usually) at least 16 years of schooling.

[31] Usually at least 12 years of schooling.

[32] Usually at least 10 to 11 years of schooling.

vocational education (5.4%), tertiary (5.0%) and lower (1.4%). Amongst females, the largest loss was noted among those with tertiary education (3.3%), whereas women with post-secondary and secondary education lost 3.1%, with vocational –2.4% and with lower –0.6%.

From Table 18 it follows that distinctive differences were noted with regard to the most important destination countries. This is clearly supported by following figures showing SI for tertiary and vocational education, and for the UK and Germany (by Polish regions).

Figure 2: Migrant selectivity indexes (SI) for tertiary education

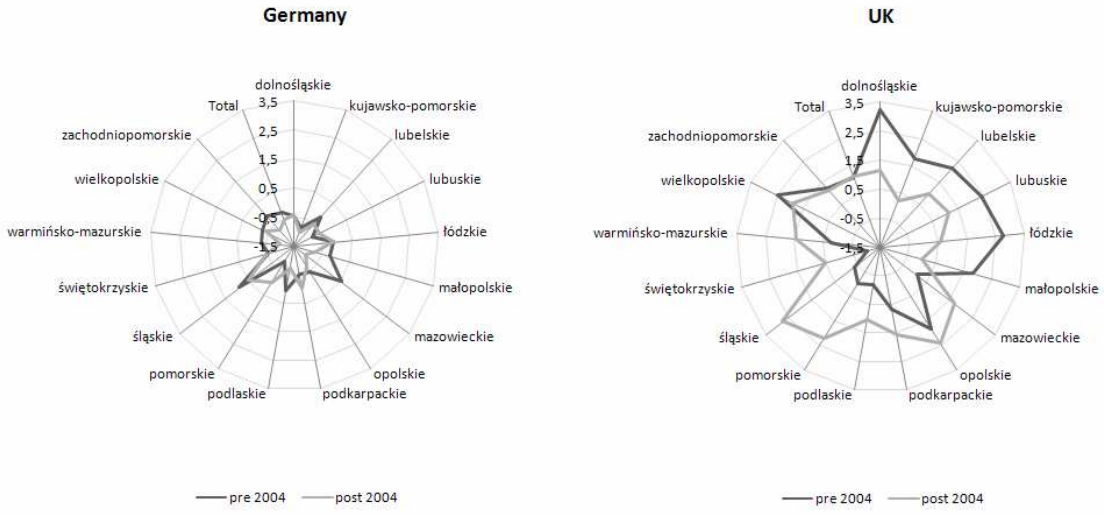
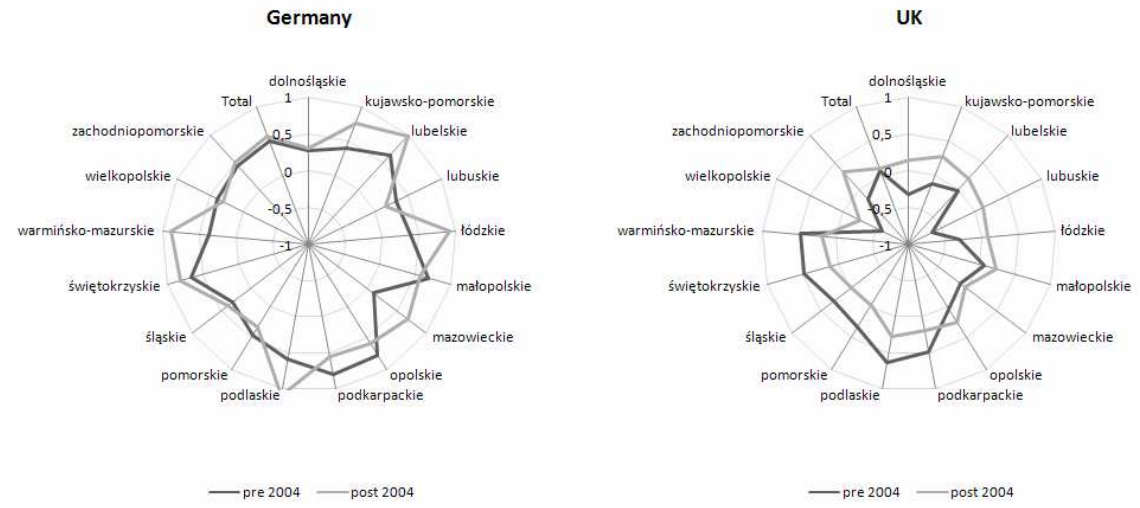


Figure 3: Migrant selectivity indexes (*SI*) for vocational education

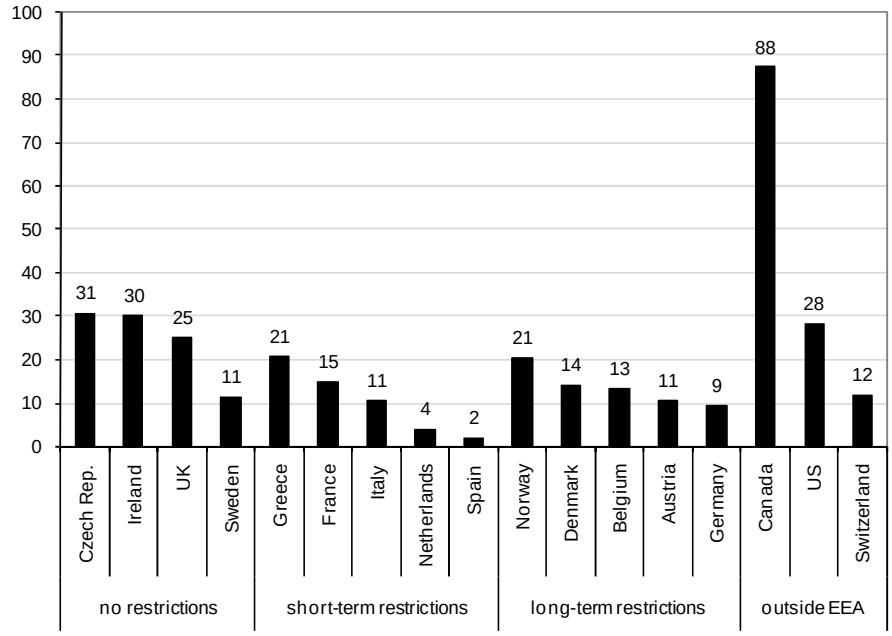


Source: Kaczmarczyk and Okólski 2008.

From the above it follows that the selectivity of migrants in various categories of education levels was diversified according to the target country (and also category of settlement – see section 5.3). Generally, the United Kingdom strongly 'attracted' the

highly educated and appeared largely neutral with regard to the poorly educated whereas, in a striking contrast, Germany 'repelled' the highly educated and moderately (positively) 'attracted' people with low education levels. Those two destination-specific tendencies — although visible in the pre-accession period — appeared to be reinforced after accession. They can be interpreted in many ways. According to the model presented by McKenzie and Rapoport (2008) structural changes in post-accession mobility can be attributed to migrant networks. The model predicts negative self-selection of Polish migrants to Germany due to relatively extensive and long-lasting migrant networks in this country and positive self-selection in case of those countries where networks are weak or non-existent (e.g. UK or Ireland). On the other hand, the change in patterns of mobility of the highly skilled in the post-accession period is to be linked to institutional changes since 2004, particularly to the opening of different forms of labour markets.

Figure 4: Share of university graduates among Polish migrants in the post-accession period, by type of restrictions imposed on the labour market access



Source: Fihel and Kaczmarczyk, 2008.

The above shows that, in general, those countries which did not introduce restrictions on mobility are gaining the "best" migrants (in terms of skills). On the other hand, countries which did impose short- or long-term restrictions are attractive predominantly to persons with relatively poorer education. However, significant differences within all groups may suggest that this pattern is to be attributed predominantly to the structure of demand in each labour market rather than to institutional arrangements in the post-accession period.

6.3 Drain effect or brain effect?

Regardless of the methodological issues and the uncertainty as to the real scale of the phenomenon, most of the data clearly indicates that there is a positive selection of emigrants from Poland and other NMS with regard to education. The next step is to assess the impact of post-accession mobility on the sending countries. We follow the line of reasoning of Beine *et al.* (2001) and analyse the consequences of the highly skilled mobility in a static (drain effect) and dynamic (brain effect) framework.

6.3.1 Drain effect

A massive outflow of migrants — as has been observed in some of the NMS — may have a significant impact on the labour market in sending countries. Consequences of out-migration include an eventual decline in unemployment (so-called export of unemployment), labour shortages (due to the outflow of workforce) and a corresponding pressure on wages.

A back-on-the-envelope analysis of the labour market data seems to support these hypotheses. In case of Poland, between the 2nd quarter of 2004 and the 1st quarter of 2007 the number of unemployed individuals decreased from 3.1 million to 1.5 million and the unemployment rate fell below 10 per cent, compared with as much as 20% in 2002 (Kaczmarczyk and Okólski, 2008). A similar situation was observed in other NMS. Furthermore, the number of vacancies is rising rapidly. Almost 13% of Polish companies reported hiring difficulties in the second quarter of 2007, compared to only 1.8% reporting such difficulties in 2005. The shortage of workers became particularly severe in construction and in manufacturing, and this situation is, again, a common feature of most important migrant sending countries of the region (World Bank, 2007).

However, even if there is a gradual improvement in the labour market of most sending countries, this can be attributed to out-migration only to a limited extent. Rather, as shown in the Polish country study, changes on the NMS labour markets can be attributed to a complex set of factors. Migration plays an important but not decisive role. The impact of mobility on labour markets in the region is largely exaggerated.

Moreover, the most severe labour shortages are observed in construction, manufacturing and agriculture and as noted by Grabowska-Lusinska and Żylicz (2008), these are predominantly manual jobs. But at the national level, the drain effect is hardly visible except in some specific cases such as medical professionals. This conclusion refers predominantly to Poland. In case of other countries, particularly the Baltic States, the outflow may have far larger impact but statistical evidence is still missing.

Kaczmarczyk and Okólski (2008) therefore suggested that recent outflow from Poland, and to some extent also from other countries of the region, should be regarded as a brain overflow rather than a brain drain. The proposed "crowding-out" hypothesis can be summarized as follows. Due to long-lasting historical processes, the number of people in Poland, their spatial distribution and their human capital characteristics do not match the

needs of a modern economy. Past migration from Poland, even in massive numbers, did not have a significant impact on the population and economy, mostly due to positive natural increase in the 1980s and 1990s. Recent mobility, for the first time in the modern history of Poland, may seriously influence labour market mechanisms, particularly if it includes people living in villages or tiny towns with still visible remnants of the subsistence sector. A large part of workforce in these areas can be seen as redundant in economic terms (both because of its excessive size and skill mismatch) and therefore out-migration may be analyzed in terms of an overflow and not drain.[33] In this context it is useful to compare the data on migration selectivity with regard to education as presented above with other data on migration structure. A change worth noting that occurred immediately after the 2004 EU enlargement was a decline in the proportion of residents of the rural settlements within the migrating population, as well as a rise in the number of residents of the urban areas. A general tendency both in the pre- and post-accession period (as shown in Table 19) was an overrepresentation of migrants originating from rural areas (relative to the respective resident population) and, to a lesser extent, from medium and small towns. However, at the country level, the differences were rather moderate.

Table 19: All and short-term temporary migrants from Poland by type of residence (category of settlement) prior to migration, before and after EU accession

Category of settlement	Resident population	All migrants		Of which short term	
	(mid-2004)	before accession	after accession	before accession	after accession
Town, 100,000 or more inhabitants	29.1	21.0	23.3	20.1	24.0
Town, up to 100,000 inhabitants	32.3	35.8	32.3	35.5	35.7
Village	38.6	40.5	38.6	44.4	40.3

Source: Kaczmarczyk and Okólski, 2008.

Changes in selectivity are more clearly visible when comparing persons with vocational and post-secondary education originating from settlements of different type (Table 20).

[33] See also the Polish country study within this project

Table 20: Migrant selectivity indexes (*SI*) for post-secondary and vocational education after EU accession (all migrants), by categories of settlement (migrants' places of residence prior to migration)

Category of settlement	Post-secondary	Vocational
Town, 100,000 or more inhabitants	0.27	0.18
Town, up to 100,000 inhabitants	0.55	0.18
Village	1.10	0.46
All settlements	0.42	0.30

Source: Kaczmarczyk and Okólski, 2008.

The selectivity analysis indicates that indeed the accession and particularly the opening of the British labour market to Polish migrant workers did not only attract more Poles to the United Kingdom, but above all it made migration worthwhile for many more highly educated individuals (in particular males) originating from villages or medium and small towns. In general, a significantly stronger propensity to migrate can be observed among people originating from economically backward regions, characterized by a high proportion of the population living in medium-sized or small towns and in villages, a relatively large semi-subsistence sector, and very limited employment opportunities. Due to recent migration these regions lost many young and highly educated persons. An increasing number among those migrants were newcomers to the labour market, people who had just completed their formal education. To assess the impact of recent migration from Poland on human capital formation and the situation in the labour market it is necessary to consider the structure of opportunities. Having in mind structural features of recent migrants and characteristics of their domestic regional and local labour markets, this kind of migration can be easily described in terms of brain overflow (outflow of an excessive supply of labour) and might be seen as a relief (rather than a threat) for the Polish labour market.

Nevertheless, a few remarks need to be made. First, the long-term impact of recent outflow is unknown. It may be true that even if the brain drain effect is not visible in the short term, the migration of highly skilled may have detrimental effects in the long-run. Second, the impact of the outflow on the attractiveness of Poland and other countries of the region for foreign investors is hard to estimate. However, one has to note that cheap and relatively skilled labour constituted one of the most important competitive advantages of the NMS economies. Thus, we cannot exclude the possibility that highly skilled mobility will influence the scale of future FDI inflows and their structure.

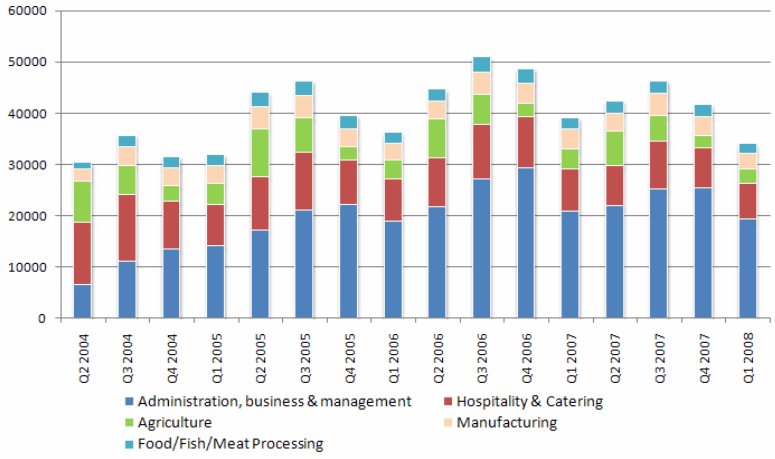
6.3.2 Brain effect

One of the critical assumptions of the theoretical model presented by Beine *et al.* (2001) is that human capital (acquired through education) is not only transferable but also is rewarded a higher return abroad. This assumption implies, in turn, that migration may positively influence the motivation to gain higher education and thus turn brain drain into brain gain. It is therefore important to analyse the position of migrants in receiving labour markets and examine to what extent skills of current migrants are employed in an

efficient way and whether there is a wage premium for skills which could induce those who stayed in sending country to acquire more human capital.

The UK Worker Registration Scheme (WRS) data may serve as the basic source of information (Accession Monitoring Report 2008). If we assume that the number and structure of applications to the WRS can be treated as an accurate measure of gross inflows, the WRS data allow one to build quite a precise picture of contemporary labour migration to the UK. The data reveal that migrant workers from the NMS tend to concentrate in only five sectors, among them administration, business and management (39%), hospitality and catering (19%), agriculture (10%), and manufacturing (7%) play the most prominent role. (cf. Fig. 5).

Figure 5: Top five sectors in which registered EU-8 workers are employed, May 2004 - March 2008



Source: Own elaboration based on Home Office WRS data

The high share of NMS migrants in "Administration, Business and Management" might suggest that these migrants achieve a relatively successful position in the UK labour market. However, this picture is largely misleading. It turns out that jobs in this sector are mainly simple jobs which do not demand high skills. It is therefore more useful to examine data on occupations rather than sectors.[34] Among the top occupations, such posts as process operative (over 212,000 applicants, 27% of all recorded), warehouse operative (63,590, 9%), packer (46,515, 6%), kitchen and catering assistant (44,810, 6%), cleaner, domestic staff (42,120, 5%) or farm worker (32,515, 4%) dominate. None of these occupations could be described as demanding high level of skills or education. Only minor changes were recorded since May 2004.

As a next step we look at the wage level of different groups of migrants in the UK labour market in order to assess the impact of education acquired on the labour market performance and throughout test the hypothesis of the existence of a brain waste.

Methodological issues

The basis for comparison of the return to education of Polish (and other NMS) workers will be the UK Labour Force Survey (LFS) and Poland's Badanie Aktywności Ekonomicznej Ludności (BAEL, or Polish LFS). Both surveys are conducted quarterly. In the case of the UK LFS, data analysed contains all of the quarters of 2000-2007. The Polish LFS data used for reference comprises two quarters: the second quarter of 2002 (i.e., two years prior to accession), and the second quarter of 2006 (i.e., two years post accession).

From the overall UK LFS survey, only the records of Polish, other NMS8 – later referred to as NMS7, NMS2 and EU15 (other than UK) migrants have been used (In general, the immigrants from NMS8 other than Poland could not be treated separately due to the size of the sample population). Out of these, less than 2/5 could be used due to the fact that the question on net earnings of the persons interviewed is asked only twice during the five interview waves. Contrary to Drinkwater *et al.* (2008), we have decided to analyse both the first wave and fifth wave responses: LFS is a household survey, and it was often the case that the immigrants interviewed within the same household in the first and fifth wave were different persons, and the repetitions of interviewed persons were not very common. Thus we decided to take into consideration two waves which allowed us to obtain larger samples.

The Polish and NMS7 migrants were divided into three categories. First, those who arrived in the UK for the first time for working purposes prior to the EU enlargement. These are referred to as pre-accession migrants. Second, those who arrived in 2005 or later, who are referred to as post-accession migrants. Third, those who arrived in 2004, but who were interviewed later, could not have their arrival date accurately determined and have been excluded from further analysis. This division reflects the fact that Polish and NMS7 citizens were not granted free access to the UK labour market prior to the 2004 enlargement. The legal status of EU15 nationals on the UK market has not changed over the period 2000-2007 dates, so this group may be considered as homogenous. Also, even after their EU accession in 2007 the Romanians and Bulgarians have not been granted full access to the British labour market, so this group of labour migrants may also be considered homogenous.

The most straightforward way of measuring the level of skill acquired by an individual is his/her highest acquired level of education. This method can not be used for immigrants (especially Polish) featured in the UK LFS data, due to the fact that the immigrant qualification levels cannot be mapped easily on the British scale included in the LFS, resulting in a great proportion of responses (both from the higher and lower end of the scale) falling into the "other" category. Therefore, following Clark and Drinkwater (2008), migrants' level of education is measured by the age left full-time education. Note that this variable can be easily transformed into a more intuitive one such as number of years of education. Subsequently, years of education were considered an educational proxy also for Poles on the Polish labour market, although, of course, an appropriate rank variable has more explanatory power in this case.

Several illustrative characteristics of the sample populations are depicted in Table 21. The results for the Polish LFS and the UK LFS are not fully comparable, especially as regards the income level. However, it is worth noting that the average income in Poland has increased between 2002 and 2006 (the two reference periods considered, as a proxy of the labour market situation in the pre-accession and post-accession periods). On the other hand, the average income level of both pre-accession and post-accession Polish migrants in the UK has steadily decreased in the post-accession period (for migrants from other NMS8 countries this was not the case). EU15 citizens earn, on average, more than

[34] This is particularly true in case of administration, business and management whereby the problem is that workers in this sector work predominantly for recruitment agencies so could be employed in a variety of occupations.

other EU migrants in the UK, although their average schooling level is lower. This may be an indication of a deepening brain waste.

Table 21: Selected descriptive statistics, LFS samples

	PL 02	PL 06	PL <04 in UK	PL >04 in UK	NMS8 <04 in UK	NMS8 >04 in UK	EU15 in UK	NMS2 in UK
Average (log) income	5.45	5.55	5.32	5.29	5.14	5.17	5.47	5.41
Average years of schooling (after 7)	13.6	14.1	14.1	13.2	12.9	11.5	12.4	13.5
Average length of employment (months)	118	117	63	8	45	9	66	36
Fraction of females	48%	48%	64%	42%	71%	46%	54%	65%
Average age	39.0	39.5	38.3	28.0	34.3	28.7	37.3	34.3

Source: own evaluation based on UK LFS (2000-2007) and Polish LFS (2nd quarters 2002 and 2006)

The average level of schooling (measured by the years of education) of post-accession migrants in comparison to the pre-accession migrants has declined slightly (while, on the other hand, the level of schooling has increased in Poland in recent years). This could mean that the brain waste effect is somewhat mitigated. The average age of a post-accession migrant is a decade lower than the age of a pre-accession migrant (however, one should note that the group of pre-accession migrants comprises persons who may have been living in the UK for decades).

To measure the rate of return to human capital we will assess the wage level of different groups of migrants on the UK labour market. In order to do so, the data on net weekly pay of full-time workers were broken down by age groups and skill level. A variable referring to age left full-time education was used as proxy of the highest level of formal education achieved. Tables 22-25 include data on net pay for three immigrant groups (NMS7 citizens, Poles, EU14 citizens) and for UK-born workers. In all cases the wage data are expressed both in nominal terms and relative to the average pay in the respective group.

Table 22: Net weekly pay of full-time workers from NMS7 in the UK (nominal and relative to the average)

	Pre-accession migrants					Post-accession migrants				
	Age groups					Age groups				
Age left full-time education	15-20	21-29	31-45	45+	Total	15-20	21-29	31-45	45+	Total
	-	227.00	150.00	187.50	182.43	-	162.50	-	216.14	204.22
Less than 15	**-**	**82.3**	**54.4**	**67.9**	**66.1**	**-**	**76.7**	**-**	**102.0**	**96.3**
	-	240.20	217.50	279.30	252.33	171.40	195.77	176.78	182.00	184.14
16 to 17	-	**87.0**	**78.8**	**101.2**	**91.4**	**80.9**	**92.4**	**83.4**	**85.9**	**86.9**
	138.33	232.37	250.26	257.06	238.05	180.57	210.06	198.25	213.56	207.23
18 to 20	50.1	**84.2**	**90.7**	**93.1**	**86.3**	**85.2**	**99.1**	**93.5**	**100.8**	**97.8**
		226.77	430.46	423.11	350.63	-	217.05	251.89	323.73	255.18
More than 21		**82.2**	**156.0**	**153.3**	**127.1**	**-**	**102.4**	**118.8**	**152.7**	**120.4**
	163.00	219.00	471.00	-	284.33	-	251.00	-	195.00	223.00
Students	59.1	**79.4**	**170.7**	**-**	**103.0**	**-**	**118.4**	**-**	**92.0**	**105.2**
	144.50	230.98	321.33	315.72	275.96	176.75	209.27	206.59	226.37	211.97
Total	52.4	**83.7**	**116.4**	**114.4**	**100.0**	**83.4**	**98.7**	**97.5**	**106.8**	**100.0**

Source: own elaboration based on the LFS data

Table 22 shows that well educated migrants from the NMS7 acquired around 20% higher pay than the average (post-2004), however, the difference was lower in case of post-accession migrants than in case of those who were employed in the UK prior to the EU-enlargement. This effect is clearly visible while analyzing data on nominal weekly pay (255 versus 350 GBP), and particularly in case of persons aged 31-45 (252 versus 423 GBP).

Table 23: Net weekly pay of full-time workers from Poland in the UK (nominal and relative to the average)

	Pre-accession migrants					Post-accession migrants				
	Age groups					Age groups				
Age left full-time education	15-20	21-29	31-45	45+	Total	15-20	21-29	31-45	45+	Total
	-	231.00	174.00	181.50	192.00	-	266.75	176.00	219.50	226.00
Less than 15	**-**	**73.8**	**55.6**	**58.0**	**61.4**	**-**	**117.4**	**77.5**	**96.6**	**99.5**
	120.00	200.00	242.33	257.17	243.12	145.67	190.50	226.10	195.08	197.24
16 to 17	**38.4**	**63.9**	**77.5**	**82.2**	**77.7**	**64.1**	**83.9**	**99.5**	**85.9**	**86.8**
	62.50	234.35	279.94	261.55	250.89	207.22	202.81	220.47	236.42	217.65
18 to 20	**20.0**	**74.9**	**89.5**	**83.6**	**80.2**	**91.2**	**89.3**	**97.1**	**104.1**	**95.8**
	-	274.83	394.57	393.38	354.54	-	223.97	306.04	255.99	244.67
More than 21		**87.9**	**126.1**	**125.7**	**113.3**	**-**	**98.6**	**134.7**	**112.7**	**107.7**
	120.00	-	-	-	120.00	518.00	-	-	-	518.00
Students	**38.4**	**-**	**-**	**-**	**38.4**	**228.1**	**-**	**-**	**-**	**228.1**
	91.25	260.45	352.77	334.35	312.83	212.95	212.36	249.97	240.42	227.14
Total	**29.2**	**83.3**	**112.8**	**106.9**	**100.0**	**93.8**	**93.5**	**110.1**	**105.8**	**100.0**

Source: own elaboration based on the LFS data

In the case of Poland, the average weekly pay of persons with the highest level of education was significantly lower in the post-accession period – in nominal terms the difference equalled (on average) over 100 GBP, in relative terms over 5 percentage points. Contrary to the NMS7, migrants relatively higher wages were noted in case of well educated persons aged 31-45. Generally, the wage level of Polish workers in the UK was slightly lower than for citizens of other NMS.

Table 24: Net weekly pay of full-time workers from the EU14 in the UK (nominal and relative to the average)

	EU15 immigrants				
	Age groups				
Age left full-time education	15-20	21-29	31-45	45+	Total
	172.13	242.40	249.44	256.05	250.82
Less than 15	**55.4**	**78.1**	**80.3**	**82.5**	**80.8**
	165.62	275.65	314.53	303.23	294.95
16 to 17	**53.3**	**88.8**	**101.3**	**97.6**	**95.0**
	176.14	253.78	360.63	372.94	324.36
18 to 20	**56.7**	**81.7**	**116.1**	**120.1**	**104.5**
		348.29	523.33	519.99	464.66
More than 21		**112.2**	**168.5**	**167.5**	**149.6**
	224.00	220.28	385.00	342.67	240.07
Students	**72.1**	**70.9**	**124.0**	**110.3**	**77.3**
	114.40	270.01	359.05	306.48	310.53
Total	**36.8**	**87.0**	**115.6**	**98.7**	**100.0**

Source: own elaboration based on the LFS data

Table 25: Net weekly pay of full-time native workers in the UK (nominal and relative to the average), 2002 and 2006

	2002, 2nd quarter					2006, 2nd quarter				
	Age groups					Age groups				
Age left full-time education	15-20	21-29	31-45	45+	Total	15-20	21-29	31-45	45+	Total
	150.00	246.14	256.29	254.61	253.00	143.08	281.14	303.28	294.49	293.48
Less than 15	**47.9**	**78.6**	**81.9**	**81.3**	**80.8**	**40.4**	**79.3**	**85.5**	**83.1**	**82.8**
	158.53	245.59	297.77	310.96	283.04	166.50	269.44	330.91	335.33	314.90
16 to 17	**50.6**	**78.4**	**95.1**	**99.3**	**90.4**	**47.0**	**76.0**	**93.3**	**94.6**	**88.8**
	166.72	257.02	356.45	369.97	316.42	187.90	272.45	392.81	414.18	354.21
18 to 20	**53.3**	**82.1**	**113.9**	**118.2**	**101.1**	**53.0**	**76.8**	**110.8**	**116.8**	**99.9**
		325.44	510.08	474.45	438.32		361.92	530.41	550.13	480.74
More than 21		**103.9**	**162.9**	**151.5**	**140.0**		**102.1**	**149.6**	**155.2**	**135.6**
	154.00	188.14	-	-	176.76	187.30	226.13	300.00	-	209.58
Students	**49.2**	**60.1**			**56.5**	**52.8**	**63.8**	**84.6**		**59.1**
	159.91	271.48	343.04	321.44	313.07	171.26	304.20	383.30	367.79	354.54
Total	**51.1**	**86.7**	**109.6**	**102.7**	**100.0**	**48.3**	**85.8**	**108.1**	**103.7**	**100.0**

Source: own elaboration based on the LFS data

Tables 24 and 25 show that there is a completely different pattern in the case of EU14 migrants and native workers (UK-born). With regard to migrants from the EU14, the average weekly pay was almost 50% higher in case of highly skilled than it was for an average worker. In case of native workers this difference was not that high (36%) but still position of the well educated on the labour market was quite favourable (in both periods under consideration).

All the above suggests that recent migrants from NMS cannot secure a wage level which would be relevant to their skill level. On the other hand, return to education on the UK

labour market was the highest in case of the EU14 workers. As a point of reference information on the weekly pay of workers in Poland has been provided (Table 26).[35]

Table 26: Net weekly pay of full time workers in Poland (nominal, in PLN and relative to the average), 2002 and 2006

	2002, 2nd quarter					2006, 2nd quarter				
Age left full-time education	Age groups					Age groups				
	15-20	21-29	31-45	45+	Total	15-20	21-29	31-45	45+	Total
	600.20	795.22	866.45	843.86	842.10	640.00	943.96	935.94	905.09	920.44
Less than 15	**55.1**	**73.0**	**79.5**	**77.4**	**77.3**	**51.4**	**75.8**	**75.2**	**72.7**	**73.9**
	763.75	762.32	923.94	936.40	908.71	890.91	900.13	1003.52	1105.78	1034.88
16 to 17	**70.1**	**69.9**	**84.8**	**85.9**	**83.4**	**71.6**	**72.3**	**80.6**	**88.8**	**83.1**
	650.18	897.94	1040.95	1082.99	1012.36	709.41	959.06	1168.31	1165.85	1118.95
18 to 20	**59.6**	**82.4**	**95.5**	**99.4**	**92.9**	**57.0**	**77.0**	**93.8**	**93.6**	**89.9**
		1132.86	1369.78	1460.46	1343.36		1197.53	1583.04	1806.93	1551.79
More than 21		**103.9**	**125.7**	**134.0**	**123.2**		**96.2**	**127.1**	**145.1**	**124.6**
	606.15	943.28	1390.65	1390.00	1050.47	651.75	960.99	1498.24	1598.33	1072.76
Students	**55.6**	**86.5**	**127.6**	**127.5**	**96.4**	**52.3**	**77.2**	**120.3**	**128.4**	**86.2**
	640.33	958.55	1131.88	1154.09	1090.02	705.00	1041.35	1301.39	1346.87	1245.05
Total	**58.7**	**87.9**	**103.8**	**105.9**	**100.0**	**56.6**	**83.6**	**104.5**	**108.2**	**100.0**

Source: own elaboration based on the LFS data

From Tables 26 and 23 it follows that while significant increases in nominal wages were observed for skilled workers in Poland, the situation on the UK labour market was completely different. The same holds true in the case of relative values. In the case of people with the highest level of education employed in Poland the average weekly pay relative to the average pay increased from 123 to 125% (between 2002 and 2006), while in the UK labour market a decrease has been noted. Although the "education premium" in Poland not that high, it is still significantly higher than in the UK.

These observations are supported by Marcinkowska *et al.* (2008). Their analysis, based on the Polish LFS data as well as other data on earnings (the October Earnings Survey), shows that people with tertiary education constitute the only group with a serious wage premium for skills (see Table 27). Additionally, education is one of the main factors explaining variance in earnings on the Polish labour market. Its importance (measured by Theil coefficient) increased from 12% in 1996 to around 22% in 2004. Thus, we could conclude that incentives to invest in higher levels of skill is the result of the situation in the Polish labour market itself, rather than from any returns to education from employment abroad.

[35] One has to note that this data are hardly comparable with the data presented above. This is not due to different currencies (relative values can be used), but mainly due to selectivity patterns among Polish migrants. As clearly stated above, Polish migrants — particularly in the post-accession period — do not constitute a random sample of the total population. In contrast, in the case of migration to the UK a clear positive selection of migrants is visible. Additionally, specific migration strategies (e.g. short term or circular mobility) may also significantly influence the wage level. Thus, such a comparison may be biased due to self-selection problems.

Table 27: Average net earnings in selected group of workers according to Polish LFS, in PLN, 2000-2006, by education

	2000	2001	2002	2003	2004	2005	2006
Total (in thous.)	1,023.96	1,103.72	1,132.21	1,132.94	1,162.57	1,213.05	1,298.72
			Average earnings = 100				
tertiary	145.81	148.07	145.37	141.79	140.41	139.49	140.04
secondary technical or post-secondary	98.95	99.28	98.09	97.99	97.20	97.17	95.79
secondary	97.51	98.73	99.53	95.05	94.13	91.81	91.76
vocational	87.07	84.62	85.14	85.24	85.00	84.11	82.93
primary or lower	76.70	75.57	74.79	75.51	74.79	73.72	71.88

Source: Marcinkowska et al., 2008

A similar conclusion with regard to the position of NMS migrants in the UK labour market can be drawn from the analysis provided by Clark and Drinkwater (2008), who showed that, according to the UK LFS data, the rate of return to human capital is far lower for migrants coming from the NMS than it is for natives or migrants from the EU15 countries. The authors of the UK country study conducted within this project derive similar conclusions: the returns to education for the NMS migrants in the UK are relatively smaller than the returns experienced by the natives; this effect is most visible for post-accession migrants, whose returns are four times lower than returns to natives. However, the return to education increases with the duration of a migrant's stay. Apart from an econometric analysis, the authors also conduct a comparative analysis of the occupational structure of the natives and migrants, by educational attainment. This exercise proves that, in general, NMS migrants are employed in less-skilled (and lower paying) occupations than their equally educated native counterparts. This effect is most striking for post-accession migrants, among whom a remarkable 36% of highly educated are employed in elementary occupations, compared to 1% of similarly educated natives. All this evidence serves as a clear indication that a "brain waste" effect occurs for highly skilled NMS migrants.

However, the analysis of the effects of the performance of migrants abroad and the scope of the brain waste is incomplete without a comparison to the sending-country situation. Even if highly-skilled workers from the NMS are employed in low skill occupations, they may still more efficiently employed than at home, which may mitigate the brain waste effect. Fihel *et al*. (2008) prove this is not so in the case of Poland (for whom the brain waste effects are the highest).

Comparing Polish (and other NMS) migrants in the UK LFS and the Polish LFS, Fihel *et al.* (2008) employ a Mincerian framework to assess the returns to education. For the different migrant groups considered, the return to skills is the highest amongst EU15 and NMS8 (except Polish) nationals in the UK. A similar, but slightly lower, level of return to education may be found among the pre-accession migrants from Poland. On the other hand, post-accession migrants from Poland and migrants from Bulgaria and Romania (NMS2) have dramatically lower returns to education: each additional year of education on average brings about an increase of net earnings 2.5 smaller than for the other groups.

A comparison of the coefficients on the education variables for Polish migrants and the resident population of Poland, for the pre-accession and post-accession periods suggest that the returns to skills in Poland have not changed much between 2002 and 2006. On the other hand, the returns to education for pre-accession and post-accession migrants from Poland have changed dramatically. Even bearing in mind the possible differences arising from the fact that the UK LFS and the Polish LFS are not perfectly comparable, one may assume that while the pre-accession migrants in the UK experienced a higher return to skills in the UK than they could have in Poland, in the case of the post-accession migrants the situation is quite the opposite. Therefore, recent flows suggest more of brain waste characteristics.

Fihel *et al.* (2008) also look for other indications of a brain waste. Evidence of the fact that recent Polish migrants' skills are not put to the best use in the UK is also derived from the dramatic decline in the explanatory power of the econometric model specified (for those migrants), when compared to older migrants or migrants originating from other countries. The fact that all the variables included in the model, such as education, experience and individual demographic characteristics, do not explain the variance of individual earnings as well as in the case of other migrants is a clear indication that these variables on the whole have less impact on the income level of an individual. This means that the jobs undertaken by recent Polish migrants in the UK have little to do with their true skills.

Thus, a combined analysis of the UK and Polish LFS suggests that there is, indeed, a brain waste observed among Polish skilled migrants in the UK, which has increased in scale after Poland's EU accession. In other words, recent NMS migrants' skills are not put to their best use. This is particularly true in case of Polish workers. Additionally, as stated above, people with tertiary education constitute the only group on the Polish labour market which acquire a skill wage premium. Such a situation may have serious consequences both in terms of human capital formation in Poland (decline in propensity to acquire higher skills for those who are planning going abroad) as well as regarding future of labour mobility. One can imagine that those whose skills are not being used efficiently are more prone to go back if the return to education is higher on the Polish labour market. Thus, the recent position of migrants from NMS in the UK (or in the EU15 more generally) labour market may significantly influence future dynamics of migration (in a negative way) and scale of returns (in a positive way). However, with regard to the former point, the strategies of migrants should be considered as well. For short-term migrants, their position in the labour market in destination country is perhaps not as important compared to those who intend to to settle there.[36] Additionally, one has to remember that statistical evidence shows significant differences between migrants from selected NMS. This refers both to their structural characteristics as well as to position on the labour market in destination countries, including the wage premium for skills. In the case of Poland a large part of recent mobility is to be explained in terms of brain

overflow. However, in the case of the Baltic States, migration is far more significant in relative terms (migrants as a share of sending population or workforce) and thus its impacts on labour market phenomena (unemployment, wages, shortages) may be greater.

Last but not least, the fact that the recent outflow from Poland, which may be considered a selective mobility of the well-educated, has the characteristics of a brain overflow signifies also that the two main effects of the outflow of skilled workers — namely, the brain drain effect and the brain gain effect — are less visible and very hard to trace. The brain gain effect is hard to assess primarily because the time span available for analysis is too short. The number of years that have passed since the NMS accession is smaller than or equal to the number of years necessary to obtain higher education. Therefore, although a trend of the growth of the popularity of education may be observed, it is impossible to determine whether this is partly a result of accession. On the other hand, the brain drain effect is hard to assess in general, due to the different scales of qualification mismatches in specific sectors and regions in Poland and the fact that the levels of educational attainment are still growing for reasons other than migration, which have a far more significant (positive) impact on the number of highly skilled.

7 Case studies

7.1 Mobility of health care professionals

One of the most controversial issues in the world-wide debate is the migration of medical professionals. This phenomenon is above all a consequence of the permanent demand for this type of migrant in highly developed countries, mainly due to unfavourable demographic trends as well as fluctuations in labour markets. Additionally, this field represents a typical example of intangible services where the human capital flow cannot be easily substituted with mobility of goods and services. In effect, potential immigrants may expect highly beneficial financial and social conditions, integration support and, in at least several receiving countries, simplified immigration procedures. There are therefore strong pull factors to encourage migration among medical professionals from the NMS.

Data on the mobility of medical professionals from the NMS is rather limited, but most of the data sources do not indicate dramatically high level of migration. According to the OECD data bases only two EU10 countries were noted among these with relatively high expatriation rates among doctors and nurses. In the case of Hungary respective numbers were as high as 2,538 doctors (expatriation rate: 7.2%) and 2,117 nurses (2.4%). In the

[36] Additionally, one may argue that absolute wages are crucial for short-term migrants while long-term migrants and those who decide to settle are oriented towards higher relative wages. In other words, if we

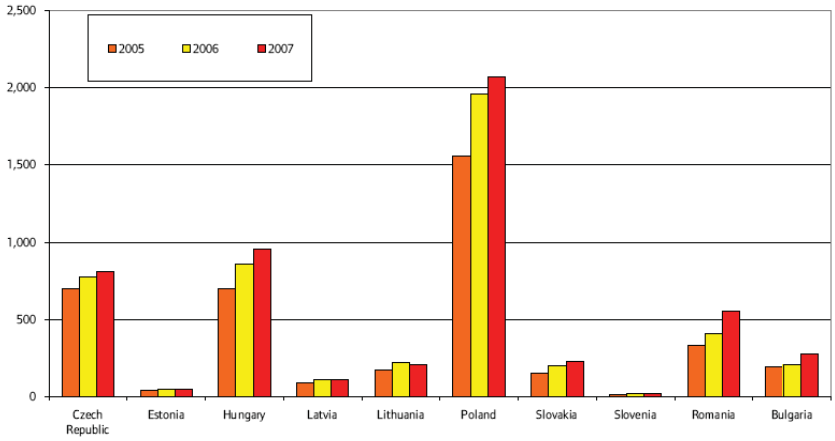
case of Poland they equalled 5,821 doctors (5.8%) and 9,153 nurses (4.6%). Note that in some countries expatriation rates among doctors were over 10%, and a few cases higher than 50% (International Migration Outlook, 2007).

The major shortcoming of the above presented data is that they do not allow one to assess the scale of recent outflows. These data refer to the stock of migrants which is an outcome of cumulative inflows in last decades. Apart from the OECD data, which is based on censuses and registers (partially also on the LFS data), information about the mobility of medical professionals is rather anecdotal. One typical example is the outcome of a study on migratory potential among heath care professionals completed shortly before the EU enlargement. This study showed that a large proportion of medical professionals at least planned to go abroad. In the case of Hungary, 25% of all health care professionals declared a definite plan and another 48% an intention to leave. In the Czech Republic results were quite similar, and only slightly smaller in case of Poland. Research conducted among Estonian health care professionals gave the result of 5.4% respondents (which is about 700-800 individuals) who had definite plan to work abroad, 17.9% who developed such plans and 32.3% who had vague plan. Only 44.4% of respondents did not take the migration into account. These results suggest a rather dramatic picture of mass students' and professionals' outflow. However, the same surveys reveal the *temporary* character of intended emigration. Of those Estonian medical professionals who want to work abroad, only 6.5% want to leave the home-country permanently, with 44.5% intending to live abroad for two years and 22% for only a few months. The percentages of physicians and nurses who want to emigrate permanently (in those who want to emigrate at all) were as high as 25%for Poland, 11% for the Czech Republic, 7% for Hungary and 5% for Lithuania (Andres, Kallaste, Priinits, 2004, Aidis, Krupickaitè, Blinstrubaitè, 2005).

Of course, it is hard to assess to what extent individuals' migration intentions were actually realised in the post-accession period. Recently published data from the UK General Medical Council shows that scale of the phenomenon is relatively low, although does seem to be increasing over time (Pollard *et al*., 2008).

apply the relative deprivation approach (Stark, 1991) the reference group for the former is sending community while for the latter it is receiving society.

Figure 6: Number of doctors born in NMS registered to the General Medical Council, 2005-2007



Source: Pollard *et al*. 2008

According to the General Medical Council data, between 2005 and 2007 an increase of over 25% were recorded with regards to registered doctors born in NMS and working in the UK. Three countries — Poland, Hungary and the Czech Republic — are responsible for most of the inflow in the post-accession period.

In the case of Poland, some indication of the scale of potential migration of medical professionals is provided by the issuing of certificates confirming qualifications and professional experience required by employers in Western European states. The number of issued certificates (6,724 as of the end of December 2007) amounted to 5.7% of the total number of medical doctors in Poland. In the case of dentists, certificates were issued to 1,924 persons (6.3% of the total). For semi-skilled medical staff, around 9,300 certificates were issued to nurses and midwives, which amounts to 0.3% of this professional group in Poland.

It follows that migration of the so-called 'white personnel' is a noticeable phenomenon. However its scale is not so large as to pose a threat to the healthcare system in the short-term. This threat is not that significant because the Polish educational system produces medical professionals at a rate still higher than their potential outflow to other states. In fact, to some extent migration of medical specialists may be viewed as another example of overflow rather than a drain of workers. This may be particularly true in the case of young professionals trapped in organizational structures with limited chances for promotion. Nonetheless, the outflow of medical doctors may be painful in the case of certain specializations.

Table 28: Certificates issued to Polish medical professionals – specialties with the highest number of certificates issued and the highest share in total number of active specialists (May 2004 – June 2006)

Specialty	No. of economically active doctors	No. of certificates issued	Share of certificates in the total no. of specialists
Specialties with the highest number of certificates issued			
Anaesthesiology	3,984	625	15.6
Surgery	5,395	334	6.1
Orthopedics	2,261	168	7.4
Internal diseases	11,792	163	1.38
Radiology	1,993	154	7.7
Specialties with the highest relation of certificates issued to the number of active specialists			
Anaesthesiology	3,984	625	15.6
Plastic surgery	142	21	14.7
Chest surgery	218	28	12.8
Radiology	1,993	154	7.7
Orthopedics	2,261	168	7.4
Total	81,346	3,074	3.7

Source: Kaczmarczyk and Okólski, 2005; Kaczmarczyk, 2008; Ministry of Health.

Table 28 shows that this especially refers to anaesthesiology (here the percentage of potential migrants amounted to almost sixteen percent), chest surgery (12.8%), plastic surgery (14.7%), as well as radiologists (7.7%). The outflow problem has a considerable impact on specialties of the most difficult position in terms of income on the Polish labour market (anaesthesiologists, radiologists) or of high demand on foreign labour markets (plastic surgeons). Moreover, a temporary or permanent imbalance on local and regional labour markets is likely to happen.

7.2 Mobility of students

As shown in previous parts of the study, if we consider recent migration from the NMS towards those countries that opened their labour markets already in 2004 (e.g. UK, Ireland) it is the young and well-educated who migrate. At the same time, theory and evidence also indicate that there is a strong connection between student mobility and subsequent labour mobility. The last few years have brought about a change in policies towards highly skilled migration. Many industrialised countries introduced targeted policies in order to attract foreign talent. Amongst the bundle of measures to recruit highly skilled migrants are in most cases also measures targeted on the retention of foreign graduates. While these policies are mainly designed for third country nationals, European governments also strengthened their activities to gain international graduates from European countries (Mechtenberg 2005; Bologna Process Working Group 2007, Universities UK 2008b). However, policies towards foreign graduates from the NMS remained ambivalent. While certain countries (UK, Ireland, Sweden) opened their labour markets already in 2004 and treat NMS graduates as other EU citizens, other countries (Austria, Germany) apply transitional regulations also to NMS graduates (BMAS, 2006, 2007). On the 1st of November 2007 Germany introduced a new regulation and facilitated

the labour market entrance of NMS graduates. Although they still need a work permit the priority check is abolished. NMS graduates need to show a work offer and the local labour agency in charge will issue the document. Before the 1st of November 2007, the labour agency checked whether there were any other Germans, EU-citizens or persons holding a permanent work permit before they would issue the work permit for the NMS-graduate (BMAS 2007).

Statistical evidence about retention rates is available from overseas immigration countries because their immigration authorities collect data on the change from one visa category to the other. Such data shows great variation across disciplines, sending countries and levels of education involved. For the US, in a long-term perspective it is estimated that around 58% of the former PhD-students are retained (Suter and Jandl, 2006). In Europe, data on retention rates is best available for non EU nationals because EU citizens do not have to apply for a work permit. In Sweden, data on work permits show that the proportion of guest students who applied for a work permit between 2000 and 2005 varied significantly by nationality (32% Iran, 6% USA) (Suter and Jandl, 2006). In the UK there is a source of information on the retention of graduates with EU citizenships since they are included in a survey on the destination of university leavers six months after graduation. The numbers for the last years indicate that the retention of EU graduates in the UK is rising. While in 2000/01 19.3% of all respondents took up work in the UK, in 2004/05 the number rose to 26.6% (Suter and Jandl 2006). In 2006/07, 18% of the non-UK EU students indicated that they wanted to take up a full-time job in the UK six month after graduation (Department for Innovation Universities and Skills 2008).

In 2005 the EU25 countries hosted over 1.1 million international students (UNESCO, 2007). A considerable part of this is a result intra-European mobility. In 2004 2.2% of the total European student population (401,000 students) were enrolled at a university in another European country for at least one year (Eurydice, 2007). These numbers exclude data on mobility in European programmes so we should add another 144,000 mobile Erasmus-students in the academic year 2004/05. By 2006/07 the number of European students participating in Erasmus increased to 159,000. In fact, Erasmus can be regarded as a motor of European student mobility and the increase in short term mobility is mainly due to European programmes. In contrast, European degree mobility increased only moderately (Teichler, 2007). France, Germany, the UK and the United States attract together more than 50% of all worldwide mobile students (OECD, 2007). Student mobility in Europe follows very specific patterns. Former colonial powers (UK, Portugal, France, Belgium and Spain) still attract huge numbers of students from their former territories, while Austria and Germany import students from CEE. The Nordic countries also show a special relation to transition countries since they host a comparatively large number of students from the Baltic States (cf. Kuptsch, 2006).

Table 29: Foreign students from EU-8+2 countries in selected target countries academic year 2006/07

source country		Bulgaria	Czech Rep.	Estonia	Hungary	Lithuania	Latvia	Poland	Romania	Slovakia	Slovenia	total
target country	Germany	12,170	2,132	724	2,434	1,667	886	14,493	4,156	1,569	524	40,755
	United Kingdom	710	1,150	535	1,040	1,485	880	6,770	740	890	285	14,485
	France*	2,615	772**					3,188	4,675			11,250
	Austria	1,309	528	40	1,199	77	48	1,467	707	1,301	567	7,243
	Sweden	317	349	393	709	112	142	2,781	907	20	46	5,776
	Netherlands	500	350	100	400	150	100	1,250	300	150		3,300
	Finland***	32	325	135	265	208	70	500	47	97	52	1,731
	Ireland	117	152	97	41	80	44	539	66	39	11	1,186

* data contains only foreign students at Universities, ** 2006, *** data on international exchange students
Source: own calculation based on target countries data

Table 29 gives the number of NMS students enrolled in the eight target countries in 2006/07. Germany is the most important target country for student migration from CEE. Over 40,000 students from the region were enrolled at German higher education institutions. The second and third most important countries (UK and France) only recruited approximately 15,000 and 11,250 students in this year. The data derives from sources in the target countries. However, for the sake of more recent data (academic year 2006/07) this brings about the disadvantage of a low comparability since the target countries use different concepts when producing data on student mobility. Whenever possible, data on international students were used (i.e. inwards mobile students) and in the remaining cases data on foreign students (i.e. students with foreign citizenship).

Table 30: Number of EU10 mobile students abroad in 2005

	total abroad	most important target countries	outbound mobility ratio (%)
Poland	31,455	DE (15,893); FR (3,217); USA (2,988); UK (2,183), AT (1,357), others (5,817)	1.5
Bulgaria	26,272	DE (12,913); USA (3,806); FR (2,903); AT (1,696); TR (1,111); others (3,843)	10.7
Romania	21,672	DE (4,520); FR (4,320); USA (3,360); HU (3,171); IT (1,521); others (4,780)	2.7
Slovakia	18,747	CZ (10,119); HU (2,341); DE (1,707); AT (1,515); USA (636); others (2,429)	9.9
Hungary	7,777	DE (2,881); AT (1,344); USA (976); FR (601); UK (584); others (1,391)	1.6
Czech Rep.	7,057	DE (2,439); USA (942); FR (654); UK (606); Austria (500); others (1,913)	1.9
Lithuania	6,514	DE (1,729); RF (1,376); USA (663); PL (558); LV (538); others (1,650)	3.6
Estonia	3,580	RF (1,057); DE (776); FI (599); USA (296); UK (187); others (665)	5.5
Latvia	3,483	DE (919); RF (884); USA (426); UK (271); EE (174); others (809)	2.8
Slovenia	2,735	DE (623); AT (619); USA (320); UK (317); IT (305); others (551)	2.3

Source: UNESCO Global Education Digest, 2007.

Table 29 can be complimented with information originated from sending countries (UNESCO education statistics). Table 30 gives an overview about the most important sending countries in quantitative terms, their main destinations and the rate of outbound

mobility in comparison to all students enrolled in tertiary education. In quantitative terms Poland is the main sending country from the region. In 2005 31,455 Polish students studied outside the borders of their home country. This is followed by Bulgaria (26,272 students abroad), Romania (21,672), Slovakia (18,747) and Hungary (7,777). For eight of the 10 countries under consideration Germany is the most important target country.

If we take the outbound mobility rate into consideration, we get an impression which of the sending countries has the most mobile students: The ranking is headed by Bulgarian students. 10.7% of all Bulgarians study outside of Bulgaria. On the second and third position follow Slovakia (9.9%) and Estonia (5.5%). Interestingly, Polish students – who represent in quantitative terms the most important sending country – are the least mobile. Only 1.5% of all Polish students are enrolled abroad.

If we look at the changing patterns in mobility from the NMS between 2004 and 2005 the general trend towards new target countries is already observable. In 2004 the UK was the fifth most important target country for Czech students. One year later it was already on the fourth position. These findings are supported by the Eurostudent 2008 report. 26% of the surveyed Czech students spent studies abroad in the UK, while only 20% went to Germany. In the Estonian case in 2005 the UK is included in the list of the five most important target countries for the first time. The number of Hungarian students enrolled in the UK increased between 2004 and 2005 from 371 to 584 students. Between 2004 and 2005 the share of the UK as fourth most attractive country for students from Latvia increased from 4.9% to 8%. In the case of Poland, the UK is for the first time included in the top five of target countries for Polish students abroad (UNESCO, 2006, 2007).

Table 30 summarizes the observed trends in the intra-European mobility of students.

Table 30: Enrolment trends with regard to NMS citizens

	AT	DE	FI	FR	GB	IE	NL	SE
general trend	→	↘	→	↘	↗	↗	PL ↘	↘
exception from the general trend	BG ↘	RO →	EE, SL →	RO,CZ →				CZ, RO, BG,Sl, SK →

Source: own elaboration

Among the target countries in Western Europe we may differentiate three groups:

(1) One group of countries (AT, DE, FR) traditionally attracted many NMS students but faces declining enrolments. In Austria enrolments from NMS decreased between 2003 and 2004 but are slowly recovering. An exception is the number of Bulgarian students that continues to decrease. A probable reason for the decrease between 2003 and 2004 is the anticipated different tuition regulation which might have convinced potential

candidates to postpone their enrolment in Austria. The decreasing Bulgarian enrolment might be explained with a decreasing young population in Bulgaria and hence an increasing supply of state funded university capacities back home. In quantitative terms Germany is the second largest target country for international students in Europe and the most important target country for students from the NMS. In the winter term 2006/07 the Federal Statistical Office counted 246,369 students with foreign citizenship (Statistisches Bundesamt, 2007). Foreign students represented 12.4% of all students enrolled in Germany and educational foreigners represented 9.5% of all students in winter term 2006/07. China is the most important sending country for educational foreigners to German universities. But remarkably, two of the NMS countries follow in the ranking. Bulgaria sent 11,816 educational foreigners to Germany in winter term 2006/07. Almost the same number of educational foreigners (11,651) came from Poland. Although the numbers have been growing considerably over the last decade, recently we observe a decrease for most of NMS with the exception of Romania. The development becomes even more visible if we take the numbers for newly enrolled educational foreigners from NMS into consideration. Bulgaria and Poland rank on the second and third position of all inwards mobile students in Germany but, since the winter term 2005/06 numbers are declining. A possible explanation for the decreasing numbers of NMS students might be demographic changes in the source countries in combination with entrance criteria for tertiary education. However, tuition fees are not responsible for the slow-down in recent years because they were only introduced in summer term 2007 in some federal states in Germany. It has been argued that tuition fees will have an influence on the enrolment of international students in Germany (CESifo 2007; DAAD, 2005). France also experienced a decline in the traditional strong enrolments of Polish and Bulgarian students. In France, we observe a general decline in overall and foreign enrolments which might explain this decrease as well. Romanian enrolment, however, is increasing which might be due to linguistic ties.

(2) A second group of countries is characterized by increasing enrolment from the NMS (UK, IE). The most interesting case is probably the changing pattern of student mobility towards the UK since 2004. The United Kingdom has a long tradition as a target country for mobile students. General arguments that explain the attractiveness of Great Britain for education migrants are the perception of a high quality of education, English as instruction language and comparatively short degrees (HEPI, 2008). From all EU15 countries it has the highest intake of mobile students: over 2.3 million students are enrolled in higher education in the academic year 2006/07 (HESA 2008a). Both the total enrolment and foreign enrolment are rising. The total number of students increased between 2005/06 and 2006/07 by 1.1% (HESA, 2008a). Between 2004/05 and 2005/06 the enrolment of foreign domicile students in the UK increased from 13.9% to 14.1%. In 2005/06 there were 106,000 foreign domicile students from the EU enrolled in the UK and 224,000 international students (non-EU foreign domicile students) (UUK 2007). None of the NMS is a main supplier of students to the UK. However, this pattern seems likely to change. Between 2005/06 and 2006/07 the numbers of Polish students increased by 56%. Both the numbers of Latvian and Lithuanian students also grew considerably (HESA, 2008a). The main reason for this is the changing tuition fee policy. The UK

charges a seven times higher fee for international students than for EU or home students. From the day of accession on NMS-students had to pay the home fee and studies in Britain became affordable. The situation even improved with the new tuition scheme introduced in 2006/07. Before this, students had to pay the fees in advance but now, they are only charged upon graduation if they earn a certain amount (Aston, 2004).

(3) A third group of countries (NL, SE, FI) attracts a smaller share of CEE students and shows diverse patterns which might be due to data restrictions. In the Netherlands, a fee charging country, the number of especially Polish students had been increasing but recently numbers are decreasing. In Sweden we observe a downward trend for some countries (PL, LT, HU, LV, EE) and a slight upwards trend for others (CZ, BG,RO, SK,SL). Finland only offers data on credit mobility but even in credit mobility there is a general downwards trend since 2006 with the exception of Estonia and Slovenia.

At this stage it is not possible to assess how much influence labour market policy towards NMS citizens had on their decision to study in the UK. But one may suppose some influence combined with a strong impact of tuition policies. Whereas there is little scope of the possible destination countries to influence the slowing demand of study abroad in the source countries due to demographic trends, destination countries will be in future need to develop targeted policies to those who are willing to go abroad. Recent developments in the UK (new retention policies, report of retention rates, projections of future demand, strong marketing, innovative tuition policies) gives reason to believe that the UK is in a good position to attract the high-skilled. In contrast, former market leaders (DE, AT) will probably see a further decline in numbers of NMS-students if they do not change their strategies.

8 Conclusions

The economic literature argues that there may be positive and negative impacts from the outflow of skilled workers. The theory suggests that there may be complex linkages between the mobility of the highly-skilled and socio-economic processes in sending and receiving countries. In particular, the analysis of the impact of the outflow on the sending countries (including impact on the human capital formation) cannot be separated from an assessment of the labour market performance of migrants in destination countries.

As shown in Sections 3 and 4, descriptive statistics on the skill composition of migrants cannot provide unambiguous arguments for or against the brain drain (the selective outflow of the highly skilled). To assess the scale and consequences of migration of this type it is necessary to control for additional effects such as the evolution in enrolment rates, labour market performance in sending countries, selectivity of migration with respect to age and so on. Unfortunately, official data sources offer a relatively weak basis for an analysis of the highly skilled mobility and its consequences. This is due both to incompleteness of migration data and other methodological issues (e.g. definitions). We argue that reference to harmonised LFS data gives an opportunity to overcome well-

known migration data limitations (as shown among others in the case of Poland) and therefore we made extensive use of this particular data set.

Our conclusions are as follows:

(1) The scale of the brain drain from the NMS in the post-accession period has been exaggerated. The apparent positive selection of migrants from the well-educated is mostly due to demographic developments (in particular the age structure of sending populations) and changes with regard to educational attainment.

(2) The study reveals significant changes in the selectivity of migration from Poland which can be related to the migration policy of EU15 countries, and particularly the introduction of Transitional Arrangements. As a consequence of these changes there has been a significant shift in migratory trajectories: the UK seems to be the winner and attracts relatively well skilled migrants while Germany remains attractive mostly for poorly educated and relatively older individuals.

(3) Analysis of the impacts of highly skilled mobility was presented in the framework proposed by Beine *et al.* (2001). The results strongly suggest that the outflow of highly-skilled from Poland should be interpreted in terms of the crowding-out (or brain overflow) hypothesis rather than the brain drain hypothesis. This conclusion, however, does not necessarily hold true for all of the NMS.

(4) The analysis of returns to human capital, based on the UK example, clearly suggests that recent migrants from the NMS do not work in jobs which match their skills or competencies. This suggests that "brain waste" may be a serious issue. This, in turn, implies that the incentive to invest in more human capital in the source countries may be reduced, so that any "brain gain" effect is weakened.

(5) In theory, the EU enlargement presented an opportunity for an extension of the brain gain effect. The introduction of the Transitional Arrangements and attempts to induce selective inflow of the highly skilled (as it is in case of Germany) was not successful so far and therefore it would be difficult to assess its effects. On the other hand, in those countries which decided to open their labour markets for migrants from the NMS, the rate of return to education is very low. Consequently, the overall effect of the outflow of highly skilled is extremely difficult to estimate.

(6) Information on the mobility of health care professionals from the NMS is rather limited, but most of the data do not indicate high levels of outflow. Nevertheless, imbalances in local and regional labour markets are already clearly visible and seriously influence public debates.

(7) Recent years have witnessed an increase in the scale of students' mobility from the NMS. However, the relative scale of the phenomenon remains very low. For example, while Poland is the main sending country of students in the region the outbound mobility ratio is still less than 2%.

(8) A comparison of the two most important students' receiving countries (Germany and the UK) shows that recent patterns of mobility are complex. A possible explanation for the decreasing numbers of NMS students in Germany might be demographic changes in the source countries, in combination with entrance criteria for tertiary education (tuition fee policy). On the other hand, changing tuition fee policies after the EU enlargement are possibly the best explanation for the high growth rates of NMS citizens studying at universities in the UK.

(9) According to the UK evidence, retention rates of students are relatively low (around 20%). This suggests that countries of origin can greatly benefit from the recent wave of student mobility, mostly via a positive impact on the human capital formation after return.

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