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***STATISTICS OR REALITY?
INTERNATIONAL MIGRATION IN POLAND***

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International Organization
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Institute of Geography and Spatial Organisation,
Polish Academy of Sciences

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* Central European Forum for Migration Research in Warsaw

Abstract: The paper aims to provide insights into the nature of migration statistics in Poland, and to present the consequences of their shortcomings from the point of view of migration research. In addition to a brief history of the Polish migration data, it covers problems with the statistics on flows and stocks of migrants, as well as with the data on residence permits, asylum, naturalisations and irregular migration in Poland. We argue that the official Polish data on international migration should be handled very carefully, taking into account the expert knowledge on their historical and social contexts. Moreover, information about population flows and stocks concerning Poland is biased by under-registration and by the fact that the definitions in use differ from the internationally-accepted standards of the United Nations. We claim that migration statistics are a way of constructing certain social and political reality, which in Poland is not based on proper foundations.

Keywords: international migration in Poland, migration statistics

Paper prepared for the Network of Excellence on International Migration, Integration and Social Cohesion in Europe (IMISCOE) Cluster A1 workshop "Regular and irregular flows: quantities, processes and types of regulations in Europe II", Istanbul, 10–12 March 2006.

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1. Introduction

Poland is a model example of a country with typical shortcomings of international migration data that are widely discussed in the literature (e.g., Bilsborrow et al. 1997; Eurostat 1997; Poulain et al. 2006). Not only are migration flows severely underreported, but also the definitions in use do not comply with the international standards of the United Nations (1998). Available information on irregular migration in Poland is scarce and primarily limited to the Border Guard statistics on apprehensions (cf. Futo, Jandl 2005; Kępińska 2005). These problems with data have profound consequences for many areas of socio-economic life, where reliable statistics on international migration and resident population is crucial from the point of view of public policy planning.

The aim of the current paper is to provide insights into the nature of migration statistics in Poland and to present the consequences of their shortcomings from the point of view of migration research.

Apart from the Introduction, the study comprises three sections. Section 2 contains a historical overview of the Polish migration data, as well as background information on the recent political situation concerning international population flows to and from Poland. Section 3 takes a demographic perspective in an attempt to identify problems with data and to assess their magnitude both on national and regional level. In other words, we try to evaluate, to what extent the Polish statistics on regular migration correspond to the actual flows and stocks of migrants. Selected issues related to the data on residence permits, asylum, naturalisations and irregular migration available in Poland are also briefly discussed. The section is concluded by a critical presentation of selected examples of migration trends emerging from the available data ('stylised facts'). Finally, a summary of major conclusions is provided in Section 4. We argue that migration statistics are a way of constructing certain social and political reality, which in Poland is not based on proper foundations.

The paper is accompanied by two appendices. Appendix A supplements the discussion presented in Section 3 and presents a simple statistical model underlying the estimation of the number of Polish emigrants in 2002. Appendix B shows the current administrative division of Poland into voivodships (NUTS-2 regions).

2. Historical and political background of Polish migration data

2.1. Historical background until 1989

Official Polish data on migration stocks and flows should be in general handled very carefully, since their analysis without paying attention to their actual content, as well as historical and social contexts of current and previous migration flows, may lead to inaccurate conclusions and reporting spurious findings. One must be aware that the shortcomings and inefficiencies of the current Polish system of collecting and reporting data on international migration greatly result from the heritage of the communist political regime (1945–1989).

Emigration, both politically and economically determined, has always been a phenomenon firmly present in the history as well as in the social consciousness of Poles. The second half of the eighteenth century, and the whole nineteenth century were dominated by the emigration of political refugees from the country then occupied by the three neighbouring empires. In addition, a mass economic outflow started at the turn of the nineteenth and twentieth centuries (Morawska 1989). In the years 1871–1913 almost 3.5 million people emigrated (which is roughly equivalent to 14% of the average population of Poland at that time), followed by subsequent 2.1 million of emigrants in the inter-war period (1918–1939).

Over a hundred years of substantial outflows resulted in an establishment of Polish migration networks abroad that contributed to a high volume of international migration, as well as to the ultimate institutionalisation of emigration and development of dedicated state agendas. The latter, to a large extent inspired by the Italian legislation on emigration introduced at the beginning of the twentieth century, were responsible for migration management and protection of Polish emigrants in their countries of residence. Emigration, though in the inter-war period regarded as a substantial loss of human capital, was seen as an important vehicle of reduction of demographic and economic pressure in the overpopulated rural regions of Poland (Jarzyna 1933). If the public and political agenda attached to international migration issues would be judged by the richness of data and variables reported in official migration statistics, the policy makers in the inter-war Poland seemed to be much more concerned with international population movements than their contemporary counterparts.

Under the communist regime of the People's Republic of Poland, international migration of Polish citizens became a highly politicized issue. Driven by ideological concerns, the communist government imposed restrictive exit rules, allowing emigration mostly for ethnic and family reunification reasons. Nevertheless, in a longer perspective, the political attempts to suppress the outflows proved to be rather futile. An on-going erosion of the communist political power was clearly correlated with the gradual liberalisation of international movement restrictions (Stola 2001). This process accelerated significantly when the migrants' remittances became an important source of foreign currency for the socialist economy. A

resulting gradual change of a dominant attitude towards international mobility is clearly reflected in the official statistics of international flows published in the Statistical Yearbooks. These data, initially sparse and parsimonious, have been extended and enriched over the years.

Until the collapse of the communist regime and the socio-economic transformation that commenced in the 1990s, the outflow and the return migration of Polish citizens were the major forms of international mobility concerning Poland. Besides, taking into account all difficulties encountered while applying for the permit to leave (especially to the Western countries), as well as potential repressions upon return in the case of overstaying abroad, most of migrations could be assumed as long-lasting or permanent. Hence, the system of registration and reporting of international migration flows, developed after the Second World War might have been relatively accurate at the beginning, given the onetime circumstances, but later became outdated and seriously inefficient, when both the socio-political context and international mobility patterns have ultimately changed.

2.2. Recent patterns of international migration in Poland

The political liberalization and economic transformation that have commenced in the 1990s, attracted to Poland the first wave of the actual (mostly temporary) immigrants, transforming Poland from the typical country of emigration into a sending-receiving country. The incoming immigrants consisted mainly of: (a) small entrepreneurs penetrating the newly-opened markets and filling the economic niches (for example, Vietnamese traders selling cheap textiles and running oriental fast-foods, cf. Koryś 2004); (b) petty traders from the former Soviet republics, who subsequently transformed into irregular migrant labour force absorbed by the emerging secondary labour market in Poland (cf. Stola 1997), as well as (c) highly-skilled professionals from Western countries, who greatly contributed to the institutional modernization in Poland and to know-how transfers. The important feature of those movements was its 'provisional' and temporary character – many migrants, including the highly skilled, were circulating between Poland and their home countries on the basis of a tourist visa, doing their businesses without required permits. An unprecedented phenomenon was also the first appearance of asylum seekers in Poland in 1990 (Kicingier 2005).

Since the beginning of the twenty-first century, the international migration patterns became much more regular. Petty traders and small entrepreneurs have been gradually pushed out of the market. Circular migration of the citizens of the neighbouring post-Soviet countries has been limited by the introduction of visa requirements. Nevertheless, a continuous demand for migrant labour force, especially in the domestic services, agriculture and construction sectors, has led to regularization of residence among a growing number of formerly-irregular migrants (Koryś 2005).

2.3. Limitations of statistics on international migration

Although the patterns of migration in Poland in the recent years have changed, the system of registration of international population flows has not. Constructed several decades ago, under different socio-political circumstances, contemporarily it seems archaic and outdated, as for example in the case of immigration it predominantly focuses on capturing the return migrants instead of the actual inflow of foreigners to Poland.

The above-mentioned problem is additionally enhanced by the legal requirements regarding immigrants. The current system of registration of foreigners fails in registering the accurate inflow, as according to definitions used by the Central Statistical Office (CSO), only those who register as permanent migrants are included into category of immigrants. According to the enacted regulations (*The Act on Aliens* of 2003) a so-called ‘permit for settlement’ is granted to those foreign citizens who have stayed at the territory of Poland for at least 3 years (as residents) or for at least 5 years (in the case of refugees or appropriate visa holders). Moreover, the applicants must also demonstrate the ‘existence of durable family bonds or economic ties with the Republic of Poland’, and document the possession of ‘accommodation and economic means’ (in other words, they must prove that they are earning a fixed income and have secure lodging)¹. Some of the applications for the permits for settlement are rejected², what implies that such persons, if they remain in Poland, are registered as ‘temporary immigrants from abroad for a period over two months’, even if their actual stay lasts for years.

Taking these shortcomings into account, the rather accurate data on ‘real’ foreigners are gathered by the Office for Repatriation and Aliens (*Urząd do spraw Repatriacji i Cudzoziemców*, URiC), by the Central Statistical Office only with respect to temporary migrants and population enumerated in the census (these issues are further corroborated in the next section of this paper), as well as by the Ministry of Labour, with regard to work permits.

Another source of bias, which needs to be addressed when using the Polish statistics on international migration, are the changes of law concerning foreigners, including its adjustments related to the harmonisation with the EU legislation. As a side-effect of changes in the legislation, longer time series of some migration-related data contain figures that are not comparable, and some sudden drops or increases in the numbers occur exclusively due to changes in definitions. An example is the number of work permits for the citizens of the EU countries, which dropped in 2004 after the accession of Poland to the EU (cf. Section 3.4).

¹ Art. 65 of *The Act on Aliens* of 13 June 2003 (Official Gazette of the Republic of Poland 2003, No. 128, Item 1175).

² According to the Office for Repatriation and Aliens, in 2005 out of 3,589 applications for permits for settlement, only 80% have been accepted, while 457 applications were rejected and 258 discontinued. Similar proportions can be observed also for the previous years.

Moreover, an adequate interpretation of the official statistics requires an additional historical background knowledge, including the one on border changes and ethnic movements in the twentieth century. Such information is crucial for a proper understanding of the data on population by citizenship and country of birth, as well as on the stocks of foreigners in some regions. The latter considers for example the Opolskie voivodship, with the dominance of persons with dual Polish-German citizenship among the registered foreigners. An illustration of some of these problems on the basis of empirical data is presented in more detail the subsequent section.

3. Migration artefact: What do the Polish data reveal?

3.1. General remarks

Problems with quality, completeness and comparability of international migration data can have various grounds, including different definitions used in particular countries, or incomplete reporting, especially of emigration, due to legal, technical, organisational, or other reasons (Bilsborrow et al. 1997). Contemporarily, in a majority of the post-communist countries of Central and Eastern Europe these problems are very serious, despite the visible efforts of the national statistical institutes aiming to improve the quality of the data (Eurostat 1997; Nowok 2005). Poland is here by no means an exception.

According to the recommendations of the United Nations, a long-term migrant should ideally be defined as ‘a person who moves to a country other than that of his or her usual residence for a period of at least a year (12 months), so that the country of destination effectively becomes his or her new country of usual residence’ (United Nations 1998: 18). It is worth noting that the definition of ‘resident population’ mirrors the one of long-term migration. As it is corroborated further in the current study, in the Polish official statistics the respective definitions are based on the concept of ‘permanent residence’ instead of ‘usual residence’.

There are typically two major types of bias related to the registration of regular migration. Let the *first-type error* be defined as the size of underreporting of migratory events, especially of out-migration, *given the definitions actually in use in a particular country*. In practice, this type of bias can be corrected after a population census, via the backward adjustment of population and migration figures, thus of data on population stocks and flows. This is usually done by the national statistical institute; in Poland – the Central Statistical Office. The Polish data on stocks are systematically corrected *ex-post* on the basis of census results, but the past net migration figures are not. Instead, a separate category in the population balance equation can be created for the *statistical adjustment* corresponding to the first-type error³.

Even *if the registration was complete*, there still would remain bias resulting from differences in definitions between the one used in a given country and the one recommended by the United Nations (1998). Let us refer to it as the *second-type error*. Its size can be assessed on the basis of auxiliary data, like for example a survey conducted in addition to a population census. In practice, information about the size of this type of bias is available for population stocks rather than for flows.

³ Cf. Council of Europe (2004: Table 8 for Poland). The adjustment can be also calculated directly from the CSO data, based on statistical or demographic yearbooks from various years, either including, or excluding post-census corrections.

Denoting errors of respective types by e_1 and e_2 , and the total registered migration by M_{Reg} , we can obtain a simple typology of international migration reporting (Table 1). Given the above classification, the overlap of both migration definitions (the one actually in use and the one internationally recommended), concerning persons who qualify as migrants under either of them, is already included in M_{Reg} and e_1 . Hence, the correct number of migrants according to the United Nations (1998) definition, denoted by M_{Cor} , equals:

$$M_{Cor} = M_{Reg} + e_1 + e_2. \quad (*)$$

Table 1. Basic typology of international migration reporting

Under which definition is a person a migrant?	Is a person registered as a migrant?	
	Yes	No
Local definition (including the overlap)	M_{Reg}	e_1
United Nations (1998) definition only	0 (by definition)	e_2

Source: own elaboration

3.2. Migration flows

International migration flows, as reflected in the official data of the Central Statistical Office, consider only persons entering or leaving Poland for permanent residence, what *de facto* means declaring *the intention* to come or leave for life. Hence, there is no defined criterion of the length of stay, after which a person is considered a migrant. This implies that Polish statistics do not conform to the one-year threshold used in the United Nations (1998) recommendations. In fact, no data on flows that would refer to a defined time criterion are collected in Poland on a constant basis (Nowok, Kupiszewska 2005: 17). Such information is available only periodically, from surveys and, recently, from population censuses. The official information about migrants and migration is collected from statistical forms, which have to be filled in by persons wishing to (de-)register their residence at the municipal office. Data from the computerised central population register (PESEL) are not used for statistical purposes with respect to population movements (Nowok, Kupiszewska 2005: 7). To avoid confusion, throughout the paper we use the terms ‘register’, ‘registration’, etc. only in reference to municipal population registers, gathering data through statistical forms, and not to the PESEL.

In addition to permanent migration, some information is collected also on ‘temporary migrants’, i.e. people changing residence for a definite period of time exceeding two months. The differentiation between permanent and temporary migration in Poland is a legacy of the communist system of population registration. Despite the fact that temporary residence may last for many years, its changes are not reflected in the official migration statistics (Nowok, Kupiszewska 2005: 19). The detailed description of migration data collection process in Poland is provided in the Polish country report from the project ‘THESIM – Towards Harmonised European Statistics on International Migration’ (Kupiszewska et al. 2006).

‘Permanent residence’ concept translates into one of the narrowest possible definitions used in the measurement of international migration. On the other end, there are countries with very short length-of-stay criteria qualifying people as migrants. For example, Germany – one of the most important migration countries in Europe – applies one of the broadest definitions of migrants. All persons moving to a dwelling in Germany, or leaving it, become registered as migrants after a period of one week (Nowok, Kupiszewska 2005: 18–20). In the case of migration between Germany and Poland, one of the major directions of population flows in Europe in the 1990s, this results in serious discrepancies between data reported by both countries, with ‘demographic fiction’ in each of them (Kędelski 1990).

With respect to deficient reporting, it has to be noted that the registration of migrants is usually (but not always) more complete in the receiving countries than in the sending countries. Migrants have more incentives to register at the destination than to deregister at the origin (Kupiszewski 2002: 106). A useful tool of inspecting the discrepancies between both sources are *double-entry matrices* of migration, showing the data of sending and receiving countries together (cf. Poulain 1999; Kupiszewska, Nowok 2005). Limiting the analysis to Poland, the respective *double-entry vectors* for emigration and immigration in 2002 are presented in Tables 2 and 3. The data are shown for eighteen major destinations / origins, which are sorted by their importance for migration exchange with Poland according to the official Polish statistics. It is worth noting that the Polish data reflect only migration by origin and destination countries, while the data on flows by citizenship are not available (Nowok 2005).

Let the *S/R ratio* be defined as the number of migrants registered in the sending country divided by the respective number recorded in the statistics of a receiving country, and let the *R/S ratio* be its reciprocal, as shown in Tables 2 and 3, respectively (terminology after: Kupiszewska, Nowok, 2005: 5). An observation that migrants are more likely to register at the destination than to deregister at origin allows for an attempt to estimate the overall number of emigrants from Poland in 2002. We assume that the S/R ratio for the total emigration equals the one for fourteen countries listed in Table 2, for which both types of data are available (thus, excluding France, the United Kingdom, Australia and Greece). There are two reasons for including the German data in the analysis, despite the clear conflict of definitions. Firstly, they consider a key migration partner country of Poland at the turn of the twentieth and twenty-first centuries. Secondly, despite differences in definitions, the S/R ratio concerning migration from Poland to Germany is very similar to the average for migration to the remaining countries.

Under very rough assumptions (see Appendix A for details), a simple statistical analysis yields that the total number of emigrants from Poland in 2002, registered in the receiving countries, equals about 141,900 persons. The 95-per cent credible interval ranges from 140,300 to 143,600. Hence, the registration systems of the destination countries recorded on average almost six times more immigrants from Poland than the Polish statistics.

Table 2. Data on emigration from Poland by main countries of destination, 2002

No.	Destination country	Sending country data		Receiving country data		S/R Ratio (1) / (2)	Source for (2)
		Poland: CSO (1)		Respective NSIs (2)			
1.	Germany	17,806		100,968		17.6%	Eurostat: NC
2.	United States	2,676		13,304		20.1%	NSI website
3.	Canada	1,016		1,076		94.4%	NSI website
4.	Austria	525		2,514		20.9%	NSI website
5.	France	339		na		na	-
6.	Italy	302		3,384		8.9%	CoE (2004)
7.	Netherlands	290		2,275		12.7%	CoE (2004)
8.	United Kingdom	254		na		na	-
9.	Australia	187		na		na	-
10.	Sweden	174		1,186		14.7%	Eurostat: NC
11.	Spain	166		3,869		4.3%	Eurostat: NC
12.	Belgium	119		2,427		4.9%	NSI website (Ctz)
13.	Denmark	95		962		9.9%	Eurostat: NC
14.	Switzerland	88		700		12.6%	Eurostat: NC (Ctz)
15.	Greece	75		na		na	-
16.	Norway	47		702		6.7%	Eurostat: NC
17.	Czech Republic	38		1,679		2.3%	Eurostat: NC
18.	Luxembourg	23		97		23.7%	Eurostat: NC (Ctz)
TOTAL		24,532		na		na	-

CoE = Council of Europe, Ctz = flows of Polish citizens, na = not available, NC = NewCronos, NSI = National Statistical Institute

Table 3. Data on immigration to Poland by main countries of origin, 2002

No.	Origin country	Receiving country data		Source country data		R/S Ratio (1) / (2)	Source for (2)
		Poland: CSO (1)		Respective NSIs (2)			
1.	Germany	2,335		78,739		3.0%	Eurostat: NC
2.	Ukraine	350		137		255.5%	CoE (2004)
3.	Italy	251		459		54.7%	NSI website
4.	France	247		na		na	-
5.	Canada	230		na		na	-
6.	Kazakhstan	221		na		na	-
7.	United Kingdom	208		na		na	-
8.	Austria	156		1,538		10.1%	NSI website
9.	Belarus	130		81		160.5%	CoE (2004)
10.	Russian Fed.	86		80		107.5%	CoE (2004)
11.	Netherlands	83		492		16.9%	Eurostat: NC
12.	Sweden	70		190		36.8%	Eurostat: NC
13.	Spain	63		99		63.6%	NSI website
14.	Belgium	61		411		14.8%	NSI website (Ctz)
15.	Greece	60		na		na	-
16.	Armenia	50		na		na	-
17.	Switzerland	41		277		14.8%	Eurostat: NC (Ctz)
18.	Lithuania	40		89		44.9%	CoE (2004)
TOTAL		6,587		na		na	-

CoE = Council of Europe, Ctz = flows of Polish citizens, na = not available, NC = NewCronos, NSI = National Statistical Institute

For immigration to Poland such estimation is not possible, as we cannot safely assume that the Polish data cover more immigrants than the statistics of the sending countries, given the permanent residence concept in use. In reality, the Polish statistics usually capture less immigrants than the data of the respective source countries. This is not only the case of migration from Germany, with the R/S ratio of the Polish data equalling barely three per cent, but also from other countries of Western and Central Europe. The only exceptions are the non-EU post-Soviet countries: Belarus, the Russian Federation, and Ukraine, with more immigrants registered in the Polish statistics than in their home countries.

Nevertheless, it seems that in most cases, apart from population flows to and from Germany, underreporting of emigration is a much more serious problem concerning Polish statistics than underestimated immigration. This has a direct impact on net migration figures, and thus also on population estimates made in the periods between the population censuses. This has profound consequences from the policy point of view, as population loss due to migration is underestimated, as are all relative measures that are based on population size. These problems concern not only demographic rates, as shown in Sakson (2002), but also key economic measures per capita, such as the GDP.

Sakson (2002) made an attempt to assess the size of migration underreporting in Poland in the 1980s, thus still under the communist regime. As a starting point she took the official population of Poland enumerated in the 1988 census, totalling 37,878,600 persons. This number was already corrected by the CSO to exclude about 50,000 permanent emigrants since the previous census carried out in 1981, whose migration was not reported to population registers. This statistical adjustment (e_1) was still no doubt seriously underestimated, mainly for political reasons, given the fact that emigration was officially restricted under the communist regime (Okólski 1994; Sakson 2002: 53–54).

On the basis of computerised registration of border crossings, previously not used in population statistics, Sakson (2002) estimated the number of ‘invisible’ emigrants in the period 1981–1989 as 590,700 persons (1.6 per cent of the census population) who illegally stayed abroad for at least one year. Her estimate, corresponding to the second-type error (e_2), conforms to the United Nations (1998) definition. The region with the highest share of ‘invisible’ emigrants in the 1988 census population was the former Opolskie voivodship (5.3 per cent, corresponding to 53,900 persons).

A similar analysis can be also performed for the period between 6 December 1988 and 21 May 2002, i.e., the between the dates of two most recent population censuses. Firstly, the statistical adjustment based on the results of the 2002 census (e_1) can be assessed by comparing the register-based and census-based estimates of the permanent population of

Poland as of 1 January 2002. This difference yields a net of 390,300 persons, who emigrated in the period 1989–2002 ‘without saying good-bye to the population register’⁴.

As this difference refers specifically to population flows that occurred between the censuses, both net migration and population stocks can be recalculated backwards for the inter-census period. In Table 4, the statistical adjustment of –390,300 people has been distributed over the period 1988–2002, proportionally to the size of net migration from Poland registered in Germany according to the German data. For 1993 no correction has been made, as the German source itself includes for that year an administrative adjustment of the Polish migrant stock by –23,000 persons, here distributed equally over the period 1988–1992. The recalculation of population and net migration numbers is illustrated in Figure 1. It has to be noted that the mid-year population for 2002 has already been adjusted by the CSO.

Table 4. Net migration and population in Poland, 1988–2002: official and corrected

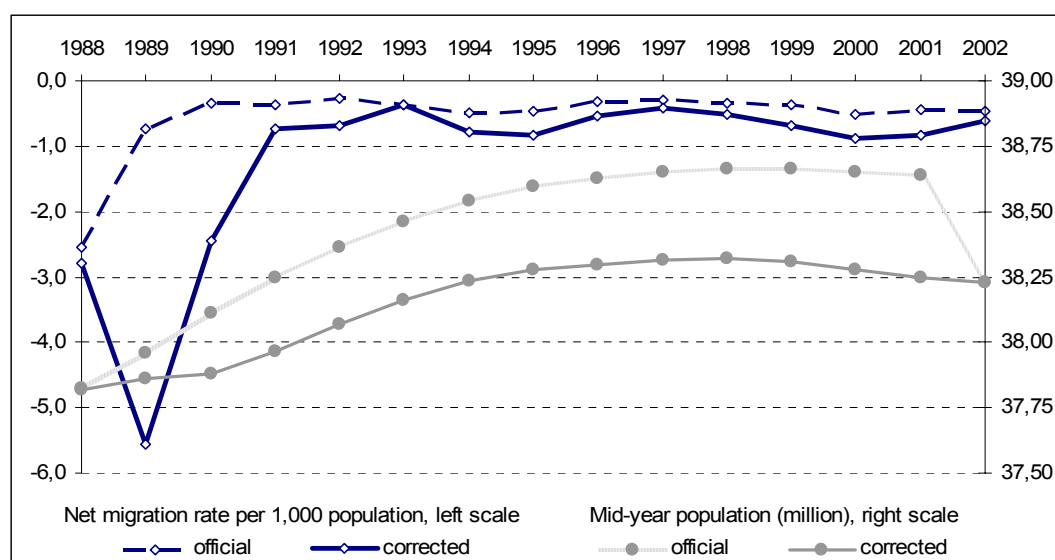
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Net migration ^a															
- official	-96.6	-27.6	-12.6	-14.2	-10.0	-14.1	-19.0	-18.2	-12.8	-11.8	-13.3	-14.0	-19.7	-16.7	-17.9
- corrected	-105.2	-210.4	-93.0	-28.0	-26.2	-14.1	-29.7	-31.8	-20.2	-15.7	-20.1	-26.4	-33.3	-31.4	-23.1
Population ^b															
- official	37.8	38.0	38.1	38.2	38.4	38.5	38.5	38.6	38.6	38.6	38.7	38.7	38.6	38.6	38.2
- corrected	37.8	37.9	37.9	38.0	38.1	38.2	38.2	38.3	38.3	38.3	38.3	38.3	38.3	38.2	38.2
Net mig. rate ^c															
- official	-2.6	-0.7	-0.3	-0.4	-0.3	-0.4	-0.5	-0.5	-0.3	-0.3	-0.3	-0.4	-0.5	-0.4	-0.5
- corrected	-2.8	-5.6	-2.5	-0.7	-0.7	-0.4	-0.8	-0.8	-0.5	-0.4	-0.5	-0.7	-0.9	-0.8	-0.6

Notes: ^a thousand persons, ^b mid-year, million persons, ^c per 1,000 mid-year population

* not corrected (no 1993 German data)

Sources: Eurostat – NewCronos, Council of Europe (2004: Table 8 for Poland), CSO, own computations

Figure 1. Net migration and population in Poland, 1988–2002: official and corrected



See also notes to Table 4

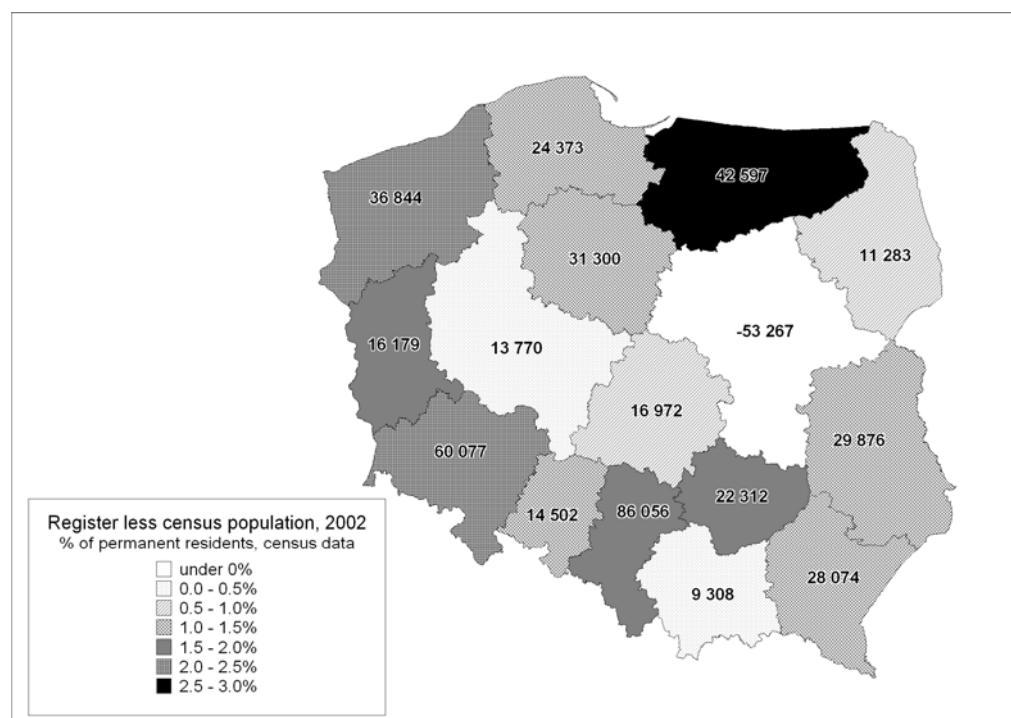
Sources: as in Table 4

⁴ Sentence attributed to Harri Crujisen, a Dutch demographer and expert in population projections.

The presented simple analysis suggests that a difference between the registered net migration (and thus also population size) and the one corrected to include the 2002 census adjustment was most severe for the system transformation period, 1989–1990. According to this simplistic correction, the more realistic net migration rate in 1989 reached about -5.6 per 1,000 inhabitants of Poland, instead of the officially reported -0.7 per 1,000.

The spatial distribution of the 390,300 persons' statistical adjustment by voivodships is presented in Figure 2 (for the administrative division of Poland, see Appendix B)⁵. In absolute numbers, this difference was largest in the voivodships: Śląskie (86,100 persons), Dolnośląskie (60,100 thousand) and Warmińsko-Mazurskie (42,600 thousand), while in relative terms – in Warmińsko-Mazurskie (2.9 per cent of the registerbased population was not enumerated in the 2002 census), Zachodniopomorskie (2.1 per cent) and Dolnośląskie (2.0 per cent). On the other end, the census-based population as of the beginning of 2002 in the Mazowieckie voivodship was higher than the register-based population by 53,300 persons (1.1 per cent). It is worth noting that numbers and rates presented in Figure 2 on the voivodship level include the balance of both international and internal (inter-voivodship) migration. Therefore, they can not be simply interpreted as measures of registration error in the case of population exchange between a given voivodship and foreign countries.

Figure 2. Post-census statistical adjustment of population size as of 1 January 2002



Sources: Eurostat – NewCronos, CSO – *Demography* database

⁵ A more detailed analysis on a smaller level of territorial division (by *powiat* – county) is presented in Śleszyński (2004).

3.3. Population stocks

As it has been shown in the previous subsection, data on population flows can be corrected on the basis of the population census to cover for the first-type error (e_1). However, there is a second element of the puzzle, resulting from non-compliance with the United Nations (1998) guidelines as to who is a long-term migrant and, respectively, who is a resident of a given territory. The missing element is the size of the second-type error, e_2 . The assessment of the latter for Poland is possible also on the basis of the 2002 census. In 2002, the CSO for the first time decided to enumerate not only the permanent population as required by the law, but also the usual resident population, in line with the United Nations (1998) recommendations. The respective definitions applied in the census were as follows (CSO 2003a: 15–16; authors' translation):

'Permanent population (permanent residents)

The category includes permanent residents (usually persons registered for permanent residence), who:

- Were present during the census, precisely at the critical moment of the census;
- Were absent during the census, irrespective of the place of stay and the length of absence.'

'Residents (resident population) – a new category of population

Residents include:

- a. Permanent residents, with the exception of persons staying away from their place of residence for at least 12 months, regardless of their place of stay (in the country or abroad);
- b. Temporary residents for at least 12 months, who came from another places in the country or abroad (foreigners).'

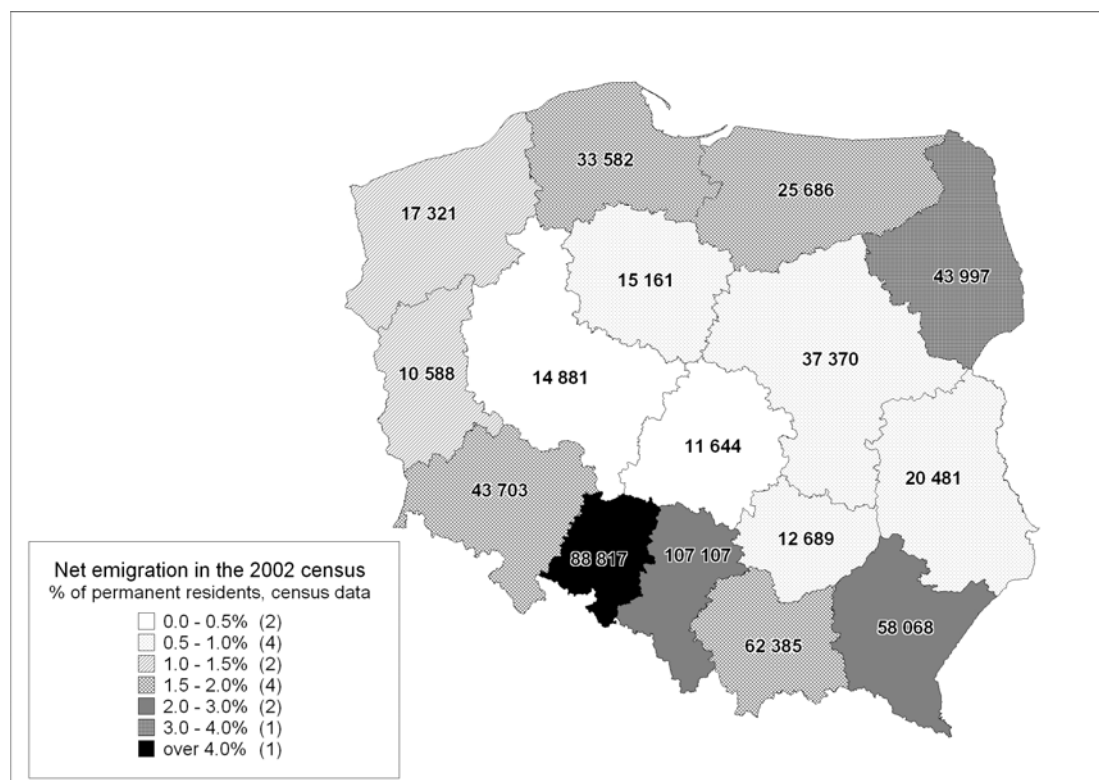
The permanent population of Poland enumerated in the 2002 census totalled 38,230,100 persons, while the resident population: 37,620,100, i.e. by 610,000 people less. This size of the second-type error (e_2) cannot be simply distributed over time to obtain corrected estimates of migratory flows, as it has been done with e_1 in the previous subsection, because some of permanent residents of Poland might have been resident abroad since the 1980s, or even longer. Interestingly, this number is not very far from the respective estimate of Sakson (2002) obtained for the 1988 census, totalling 590,700 persons. This may indicate that on balance the stocks of non-deregistered Poles living abroad may still be to some extent the legacy of the communist period, especially of the 1980s.

The above-mentioned estimate of e_2 is additionally supported by the results of an additional module of the population census, related to international migration (CSO 2003b). As of 2002, about 22,700 persons have been recorded as immigrants for a period over twelve months, while some 626,200 – as long-term immigrants (CSO 2003b: 116, 168). These figures, complying with the United Nations (1998) standards, yield a net of 603,500 people out of the country, a magnitude very similar to 610,000 difference between the permanent and resident

populations quoted above. Nevertheless, despite the availability of this information, the CSO calculates a majority of statistics only for permanent residents, overestimating the real population size of Poland by 0.6 million people.

A territorial distribution of the net of 603,500 emigrants recorded in the 2002 census is presented in Figure 3. The highest shares of net emigration in the population enumerated in the census have been recorded in the voivodships: Opolskie (8.3 per cent), Podlaskie (3.6 per cent), Podkarpackie (2.8 per cent), and Śląskie (2.3 per cent), while the highest absolute numbers – in Śląskie (107,100 persons), Opolskie (88,800), Małopolskie (62,400), and Podkarpackie (58,100).

Figure 3. Net long-term emigration (for over 12 months) as reported in the 2002 census



Sources: CSO (2003b: Tables 14 and 38), own computations

Apart from the data on long-term migrants, the migration module of the 2002 census includes also some other important information. Firstly, there are data about 85,500 people, who have arrived or returned from abroad in the period 1989–2002. Out of those, 69,700 are Polish citizens and 15,800 are foreigners, stateless, and persons of unknown citizenship (CSO 2003b: 92). Similar results have been yielded by the migration survey conducted together with the census. The survey covered 83,100 people, of whom 67,300 have been found return migrants – permanent residents who stayed out of the country for a year or longer, and further 15,700 as newcomers – permanent residents abroad, staying in Poland for over twelve months (CSO 2003b: 350). Clearly, the two above-mentioned distributions are strongly interrelated: immigrants with Polish citizenship are most likely return migrants, while the foreign citizens are typically newcomers.

All migration-related data published by the CSO (2003b) on the basis of the migration module of the census are available in many breakdowns: by sex, age, voivodship, type of municipality (urban or rural), citizenship, country of previous / current residence, year of arrival / departure, migration motive, marital status, level of education, occupation (for survey data), etc. Regrettably, despite the availability of this fairly detailed census-based information, no efforts have yet been made to recalculate the official data on population flows and stocks from the years preceding the census.

Differences in definitions have profound consequences also for the Polish data on population stocks by citizenship and by country of birth (Tables 5 and 6). The CSO publishes respective official statistics only for the permanent population. Hence, they do not cover a majority of foreigners without a permanent residence permit, who nevertheless fall under the category of residents and should be included in the population stocks of Poland. On the other hand, out of 485,600 foreign citizens in Poland, some 444,900 (91.6 per cent) have dual citizenship (Polish and other, most frequently German), and in most cases are not immigrants.

Table 5. Permanent population in Poland by citizenship and country of birth, 2002

Citizenship	Number	Percent	Country of birth	Number	Percent
TOTAL	38,230,080	100.0	TOTAL	38,230,080	100.0
Only Polish	37,084,821	97.0	Poland	36,871,281	96.4
Foreign (including dual)	485,591	1.3	Abroad	775,282	2.0
<i>by number of citizenships:</i>			<i>of which:</i>		
- dual Polish and foreign	444,930	1.2	- Ukraine	309,131	0.8
- only foreign / stateless	40,661	0.1	- Belarus	104,463	0.3
<i>by citizenship:</i>			- Germany	101,633	0.3
- German (incl. dual)	287,510	0.8	- Lithuania	79,769	0.2
<i>- of which:</i>			- Russia	54,226	0.1
- - Polish and German	279,639	0.7	- France	34,634	0.1
- - only German	7,871	<0.1	- USA	9,004	<0.1
- US (incl. dual)	31,391	0.1	- Czech Republic	6,200	<0.1
- Canadian (incl. dual)	14,756	<0.1	- Austria	4,312	<0.1
- French (incl. dual)	8,070	<0.1	- Italy	4,292	<0.1
- Ukrainian (incl. dual)	6,361	<0.1	- unknown country	18,390	<0.1
Unknown	659,668	1.7	Unknown	583,517	1.5

Source: CSO (2003a: Tables 26 and 30)

Table 6. Permanent population by citizenship and country of birth, 2002: cross-tabulation

Place of birth	Citizenship			TOTAL
	Polish (incl. dual)	Foreign (incl. stateless)	Unknown	
Poland	36,765,038	10,135	96,108	36,871,281
Abroad	741,880	29,748	3,654	775,282
Unknown	22,833	778	559,906	583,517
TOTAL	37,529,751	40,661	659,668	38,230,080

Source: CSO (2003a: Table 32)

The category of country of birth is also not informative for migration studies, as it refers to the present borders of countries and not to the historical ones (CSO 2003b: 29). Therefore, the foreign-born population includes Poles born before or during the second World War in the formerly-Polish territories currently belonging to Ukraine, Belarus and Lithuania. Such cases undoubtedly account for a majority of 741,900 Polish citizens born abroad.

3.4. Residence permits, asylum, naturalisations and illegal migration

The data on the residence permits gathered by the Office for Repatriations and Aliens is *de facto* the only source allowing for calculation of the actual number of the regular foreign newcomers. As an example, the time series for 1995–2004 for the main categories of the residence permits are shown in Table 7, including applicants for refugee status.

Table 7. Foreigners in Poland according to the type of the residence permit, 1995–2004

Year / country of citizenship	Foreigners					
	<i>studying in Poland</i>	<i>who received permission for work in Poland</i>	<i>who received permission for settlement</i>	<i>who received permission for temporary residence</i>	<i>who received permit for tolerated stay</i>	<i>who applied for refugee status</i>
Total:						
1995	5,202	11,363	3,067	-	-	843
1996	5,313	13,668	2,841	-	-	3,211
1997	5,443	17,498	3,973	-	-	3,531
1998	5,541	20,759	1,657	4,893	-	3,423
1999	6,025	20,618	551	16,810	-	3,061
2000	6,563	19,662	857	15,037	-	4,662
2001	7,380	19,793	690	20,787	-	4,529
2002	7,608	24,643	607	29,636	-	5,170
2003	8,106	19,831	1,735	28,579	72	6,909
2004	8,829	13,179	4,366	25,427	1,097	8,079
<i>of the 2004 figures, the most numerous countries of citizenship:</i>						
- Ukraine	1,965	2,743	1,658	8,520	36	72
- Belarus	1,211	1,025	389	2,008	18	52
- Vietnam	196	1,063	368	1,875	62	16
- Armenia	60	268	235	1,793	45	18
- Russia	388	584	446	1,605	761	7,183
- India	156	430	40	641	7	151
- United States	623	527	61	898	-	-
- Germany	254	982	63 (1,419)*	409 (303)*	-	-
- France	53	658	25 (999)*	330 (156)*	-	-
- United Kingdom	36	319	16 (601)*	212 (135)*	-	-

* Figures in brackets denote permits for residence and temporary stay issued in 2004 to the citizens of the EU countries and members of their families

Source: CSO (*Demographic Yearbook of Poland*, 2005 and 2004); Office for Repatriation and Aliens

Interpretation of the figures presented in Table 7 requires, however, some additional attention. Temporary residence permits must be renewed annually, hence this category *de facto* reflects population stocks. On the other hand, the permits for settlement are granted only once, and

therefore relate to the flows of migrants. Moreover, only after obtaining a permit for settlement, a foreigner can be registered in the municipality as a permanent resident of Poland, and be included in the official statistics on migration flows published by the CSO. The same applies to applicants for refugee status: they are counted as immigrants only after obtaining a permanent residence permit and being registered in the municipal office. However, only people granted asylum obtain the permit without a delay, while for the foreigners granted refugee status or subsidiary protection, such a procedure can take years (Kupiszewska et al. 2006: 588). These problems contribute to artificial shifts in the time series of immigrants to Poland.

Furthermore, it should be noted that the data on students, originating from the Ministry of Education, reflect stocks as of 30 September of a particular year. Data on the work permits, issued originally by the Ministry of Labour and Social Affairs, can be problematic due to differences in length of the permits issued. Some of them are valid for two years, some other – for two months, and it is not sure, whether these discrepancies are taken into account in the data.

With respect to work permits and permissions for temporary residence for the EU citizens, the statistics presented in Table 7 lead to an erroneous conclusion that the number of immigrants from the other EU countries is continuously declining. However, the opposite is true – the EU citizens prolonging their stay in Poland begin to acquire separate permissions for temporary residence, ‘disappear’ from the joint statistics of the Office for Repatriation and Aliens presented in Table 7, and are reported in a separate category of statistics⁶. This is an example of an impact of the EU-adjustments in the legislation for the presence of structural breaks in the series of the international migration data.

Regarding the official figures on naturalisation, their comparability over time is also limited, as between 1992 and 2001, only the acquisitions of nationality in the conferment procedure were reported. Since 2002, the reported cases additionally include acquisitions of nationality in the acknowledgment and marriage procedures, what is clearly reflected in an instant increase in the number of naturalisations (see Table 8). Moreover, one must be aware that in case of migrants from Israel or Germany, the ‘acquisition’ of the Polish citizenship refers rather to its restoration for those migrants (and their descendants) who were lawlessly deprived of the Polish citizenship by the communist authorities.

Detailed comments on the data on residence permits, asylum, acquisitions and losses of citizenship can be found in the Polish country report from the THESIM project (Kupiszewska et al. 2006: 587–588), while comprehensive statistics for the recent years – in the SOPEMI report for Poland (Kepińska 2005).

⁶ See for example: *The Demographic Yearbook of Poland 2005*, Table 20 (201): Permits for Residence and Temporary Stay Issued to the European Union Citizens and Members of their Families in 2004, by Citizenship: 446.

Table 8. Total number of Polish citizenship acquisitions, 1992–2004

Year	1992*	1993*	1994*	1995*	1996*	1997*	1998*	1999*	2000*	2001*	2002**	2003**	2004**
Acquisitions	1,522	834	751	1,036	679	555	871	1,000	975	766	1,186	1,634	1,937

* acquisition of Polish citizenship in conferment procedure

** acquisition of Polish citizenship in conferment, acknowledgement and marriage procedures

Source: Office for Repatriation and Aliens, after Kepińska (2005: Tables 35 and 36)

An overview of available Polish sources of data on illegal migration, as well as selected statistics for 2003 and 2004 are provided in the ICMPD yearbook (Futo, Jandl 2005). The numbers usually come from the database of the Border Guard of the Republic of Poland. The figures for 2004 quoted by Futo and Jandl (2005: 163–166) include: migration-related border apprehensions (5,800 cases), persons rejected at the borders (66,000), and deportations (6,200 cases). In the same source there are also some data about asylum claimants, quoted after the Office for Repatriation and Aliens (URiC). An interesting picture emerges from the statistics on border crossings, with 98.3 million entries and 97.7 million exits in 2004. The difference, a net of 600,000 cases, is likely due to a combination of many factors, including under-recording of outflows at the frontiers, overstaying of visas by people who entered Poland legally, and finally regular long-term immigration.

The above-mentioned categories of data, although interesting *per se*, do not inform about the magnitudes of illegal population flows concerning Poland, nor about the stocks of population of an irregular status present in the country in a given period. The existing global estimates are scarce and based on expert judgement rather than on reliable statistical information. An example is a recent study by Iglicka (2003), who estimated the number of irregular economic migrants in Poland originating from the countries of the former Soviet Union as about 100,000 yearly in the late 1990s. Her maximum judgement about the number of irregular migrant workers from all countries of the world for the same period totals about half a million persons a year.

From a comparison of the magnitudes of the available official figures with the expert judgement of Iglicka (2003), it can be presumed that the cases known to the Polish authorities, limited to persons apprehended or deported, amount only to a small fraction of all irregular migrants in Poland. Nevertheless, with respect to the incompleteness of the data, it has to be noted that this problem is not specific to Poland, but is rather an issue, which due to its very nature is difficult to tackle in all European countries.

3.5. Some stylised facts based on official Polish migration statistics

The official statistics on international migration allow (at least in theory) for depicting some tendencies of population flows dominant in a given period. For example, Table 9 shows selected data on registered immigration to Poland in the years 1997–2004 by the main regions of origin. For the period 2002–2004, the table is enhanced with an additional information on the sex distribution of the migrants. These data can be potentially used in the studies of such phenomena as the feminisation of migration, or increasing dispersion among the countries of origin.

With respect to the feminization of immigration to Poland, it is clear that there is a marked disproportion between both genders. The migrants from all continents apart Europe, include a prevalence of men, since these are usually the ‘pioneers’ of a migration chain. However, a reverse trend is to be noted with regard to migration from the adjacent formerly-Soviet republics. This reflects a specific demand for migrant labour force in Poland, with a large numbers of female migrants employed in the domestic sector: housekeeping, child- and elderly-care.

Table 9. Inflow of immigrants to Poland by region of origin (vertical structure), 1997–2004

Origin of immigrants	1997	1998	1999	2000	2001	2002		2003		2004	
	Total	Total	Total	Total	Total	Total	<i>Of which Females:</i>	Total	<i>Of which Females:</i>	Total	<i>Of which Females</i>
Total	8,426	8,916	7,525	7,331	6,625	6,587	46%	7,048	47%	9,495	49%
<i>of which:</i>											
- Europe*	5,334 (63%)	5,593 (63%)	4,923 (65%)	4,821 (66%)	4,561 (69%)	4,413 (67%)	50%	4,498 (64%)	51%	6,536 (69%)	52%
- - EU-25	na	na	na	na	na	na	na	na	na	4,451 (47%)	44%
- - EU-15	na	na	na	na	na	3,575 (54%)	46%	3,503 (50%)	46%	4,261 (45%)	44%
- Former USSR	na	na	na	na	na	920 (14%)	52%	1,110 (16%)	58%	2,283 (24%)	68%
- Africa	204 (2%)	165 (2%)	149 (2%)	120 (2%)	99 (1%)	44 (1%)	36%	114 (2%)	40%	164 (2%)	27%
- America	1,685 (20%)	1,759 (20%)	1,851 (25%)	1,622 (22%)	1,352 (20%)	1,403 (21%)	45%	1,622 (23%)	47%	1,759 (19%)	46%
- Asia	1,033 (12%)	1,206 (14%)	434 (6%)	648 (9%)	457 (7%)	548 (8%)	44%	703 (10%)	38%	893 (9%)	43%
- Oceania	165 (2%)	187 (2%)	187 (2%)	154 (2%)	102 (2%)	105 (2%)	45%	110 (2%)	41%	140 (1%)	50%

* Including Turkey and Cyprus.

Source: CSO – *Demography* database, *Demographic Yearbooks* (various years)

Again, the figures from Table 9 need to be interpreted with caution, as the remarks from the previous subsections remain in force. The numbers shown predominantly reflect return migrants from Europe and the United States, repatriates, as well as people who obtained settlement permits. The vast majority of actual newcomers to Poland is therefore excluded from such a ‘stylised’ analysis, what can be seen from a comparison with Table 7. For the same reason, any inference on the changes in the dispersion of the countries of origin for the

registered immigration to Poland, on the basis of the data shown in Table 9, would be rather vague.

As noted in the THESIM country report for Poland (Kupiszewska et al. 2006: 580, 587), the data on migration by motive (economic migrants, migrants for family reunification, students, refugees, participants in professional training programmes, etc.) are gathered for the residence permits by the Office for Repatriation and Aliens (URiC). Unfortunately, as the system can register several reasons for a single person, and the main migration motive is not distinguished, the disaggregated data are not made publicly available. For this reason it is not possible to determine on the basis of the official statistics, whether migration in Poland is becoming increasingly more politicised an issue with respect to selective immigration.

4. Conclusions and recommendations

Summing up the analysis presented in this study: the official Polish data on international migration should be handled very carefully, taking into account the expert knowledge on their historical and social contexts. As it has been noted in Section 2, the system of registration of international population flows did not follow the changing patterns of migration in Poland in the past. This system in its current form, being an outcome of legal regulations in place, predominantly captures return migrants instead of the actual foreign newcomers to Poland. Another source of bias is related to the changes of legal regulations concerning foreigners and migration. This is especially important in relation to the harmonisation with the EU legislation, which may render some migration-related figures incomparable across various periods of time. It has to be reiterated that additional background knowledge on the very nature of the data under study is a necessary prerequisite of utilising Polish official statistics in migration research.

Contemporarily, information about population flows concerning Poland is biased by under-registration and by the fact that the definitions in use differ from the internationally-accepted standards of the United Nations (1998). This also applies to population stocks, which despite the adjustment made after the 2002 population census are still artificially enlarged by over 600,000 persons. This number shows the magnitude of the difference between the non-registered long-term emigrants and immigrants, or alternatively between the permanent and resident populations. There are some regions, e.g., the Opolskie voivodship, where these problems are especially vital. This is not surprising, as in this region there is a very high concentration of population of German ethnic background, including many cases of dual Polish-German citizenship.

In consequence, the official population of Poland is overestimated by 1.6 per cent, and by the same order of magnitude are underestimated demographic and economic measures that relate certain quantities to the population size (birth and death rates, GDP per capita, etc.). As it has been shown by Sakson (2002), errors of estimation of age- and region-specific rates can even exceed 20 per cent. In the case of international migration rates, problems both in the nominator of a rate (underestimated migration), as in the denominator (overestimated population) act in the same direction and produce a synergetic effect of seriously underestimated relative intensity measures of population flows. In this way, migration statistics construct certain social and political reality, which in the light of the empirical findings presented before is not properly based on facts.

In general, international migration flows in Poland, as seen through the official figures published by the Central Statistical Office, are more a statistical artefact than reality. With respect to irregular migration, the available statistics cover only the cases that are known to the authorities: apprehensions, deportations, refusals of entry, etc. Clearly, this is just the tip

of an iceberg. The latter problem, however, does not seem to be specific to Poland, but is rather a general characteristic of all data related to irregular phenomena, including migration.

Therefore, the development of procedures aimed at an accurate measuring of international migration flows in Poland is of great importance both to correct the demographic and economic measures, as well as to assess the socio-demographic consequences of any migration policy. The question, whether the improvement of migration statistics and an accurate knowledge on the exact scale of migration in Poland would become an important political agenda leading to a substantial reform of the Polish system of international migration data collection, remains open.

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Data sources in Poland:

Central Statistical Office (CSO) / *Główny Urząd Statystyczny (GUS)*:

«www.stat.gov.pl»

Office for Repatriation and Aliens / *Urząd ds. Repatriacji i Cudzoziemców (URiC)*:

«www.uric.gov.pl»

Border Guard of the Republic of Poland / *Straż Graniczna RP*:

«www.strazgraniczna.pl» (site in Polish)

Appendix A. Overall number of Polish emigrants in 2002

In an attempt to estimate the overall number of Polish emigrants in all destination countries in 2002 a simple statistical model is proposed, based on the following assumptions:

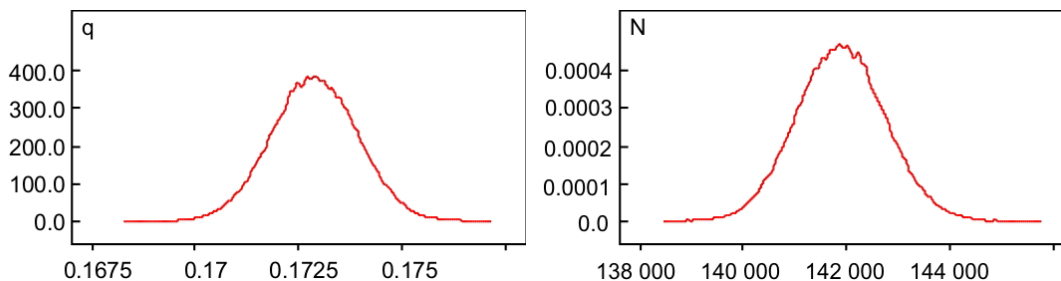
- (1) All migrants who are deregistered in Poland, are implied to be also registered at the destination, and the opposite needs not hold. This assumption concerns ‘law-abiding’ migrants: if someone fulfils the requirements that are not restrictively controlled in the country of origin, the more (s)he does what is obligatory in the receiving country (cf. Kupiszewski 2002: 106). Irregular migrants are excluded from the estimation.
- (2) Migrants deregister in Poland with a probability q , which is destination-invariant.
- (3) Polish statistics capture all possible destination countries.
- (4) We have no prior knowledge about the probability of deregistration q , which is reflected by a uniform prior distribution of q over the interval $[0, 1]$ with a density function $p(q)=1$ for $q \in [0, 1]$ and $p(q)=0$ otherwise.

From (1)–(3), the expected number of migrants registered at all destinations, N , equals the number of migrants deregistered in Poland, n , divided by the probability q . From the Bayes theorem and (4), the posterior distribution of q given the observed data x on M migrants registered in the receiving countries, of whom m have deregistered in Poland, is:

$$p(q | x) = \frac{p(x | q) \cdot p(q)}{p(x)} = \frac{q^x \cdot (1 - q)^{1-x}}{\int_0^1 q^x \cdot (1 - q)^{1-x} dq}, \text{ defined for } q \in [0, 1]. \quad (**)$$

In (**), $x = 1$ for m migrants who deregistered in the country of origin (‘successes’) and $x = 0$ for the remaining $M - m$ ones (‘failures’). The likelihood $p(x|q)$ has a Bernoulli distribution with a success probability q . The data consider 14 countries, listed in Table 2, for which information about migrants from Poland was available. The calculation of (**) has been performed numerically in the WinBUGS 1.4 software (Spiegelhalter et al. 2003), yielding the posterior distributions of q and of N shown in Figure A1 and summarised in Table A1.

Figure A1. Posterior densities of deregistration probability q and the number of migrants N



Source: Own computations

Table A1. Posterior summaries of deregistration probability q and the number of migrants N

Variable	Mean	Std. dev.	Quantile 0.025	Median	Quantile 0.975
q	0.1729	0.0010	0.1709	0.1729	0.1749
N	141,900	849	140,300	141,900	143,600

Source: Own computations

Under the assumptions (1)–(4), the expected number of regular migrants from Poland registered in 2002 in all destination countries equals 141,900 persons, with the 95-per cent credible interval ranging from 140,300 to 143,600. Of those, migrants captured in the Polish statistics comprised on average 17.3 per cent, with the 95-per cent credible interval [17.1%, 17.5%].

In reality, the assumptions (1) and (2) are very strong. Lifting the first one would require performing for example the capture-recapture estimation of dual data systems (Marks et al. 1974) based on individual-level data, which in the case of Poland are almost impossible to obtain. The second assumption does not account for different definitions of migrants used in various countries, assuming that only *on average* they reflect the ‘real’ long-term migration. Adjusting for different definitions would itself require a complex modelling, far beyond the scope of the presented example⁷.

Therefore, the estimate of N shown in Figure A1 and Table A1 does not precisely reflect the actual number of long-term Polish emigrants according to the definition of the United Nations (1998). The calculation is provided merely for an illustration of the scale of differences between the coverage of migration statistics in Poland and in the destination countries. It can be concluded that in 2002 the receiving countries recorded on average almost six times more immigrants from Poland than the Polish population register itself.

The source WinBUGS code used in the calculations is as follows:

```
model {
for (t in 1:m) { x[t] <- 1 } # m 'successes': registered in PL
for (t in m+1:M) { x[t] <- 0 } # M-m 'failures': not registered in PL
q ~ dunif(0,1) # Set a uniform prior distribution for q over [0,1]
for (t in 1:M) { x[t] ~ dbern(q) } # Set the Bernoulli model
N <- n/q } # Estimated number of registered emigrants
list( n = 24532, m = 23365, M = 135143 ) # Data row (see Table 2)
```

⁷ More on the modelling of migration flows on the basis of various data sources can be found for example in Raymer & Willekens (2006).

Appendix B. Administrative division of Poland

Figure B1. Territorial division after 1999: 16 voivodships (NUTS-2 regions)



Source: MapInfo



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