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Emigration Triggers: International Migration of Polish Workers between 1994 and 2009

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Abstract

This paper analyzes the emigration propensity of Polish workers between 1994 and 2009. Particular attention is paid to a labour market situation of prospective temporary emigrants, the role of developments on host labour markets and the importance of an open-door policy. The Polish household survey data suggest that temporary emigrants are generally young, more frequently male than female, well educated but with less labour market experience, and have less family commitments than stayers. Other things equal, non-employed are twice that likely to emigrate as employed. The propensity to emigrate varies substantially among the employed. Farmers and employees employed on permanent contracts or in jobs with a high social prestige (managerial or specialist positions) are least probable to leave Poland. The highest propensity to emigrate is observed among temporarily employed or helping family members. The introduction of an open-door policy by majority of the European Economic Area countries after 2004 significantly facilitated emigration from Poland and increased the share of workers leaving to countries with the more liberal immigration regime. The open-door policy within the European Economic Areas amplifies responses of Polish workers to cyclical fluctuations in employment opportunities abroad. Similar changes in the unemployment rate (real wages) abroad lead to more pronounced reaction of temporary emigration or return migration flows, then before the European Union enlargement.

1 Introduction

As there are significant and persistent wage differences between world regions, migration of workers to prosperous areas appears puzzlingly low. It is difficult to reconcile the global dispersion of income with the moderate intensity of international migration even accounting for the inter-regional variation in chances of finding employment. A strength of the relation between economic factors and labour migration has a bearing on character and speed of adjustments of economies to demand and supply shocks. As such, knowledge of a relative role of economic factors in facilitating labour force relocation should help designing not only optimal migration but also labour market or macro policies.

Migration theories provide various economic explanations for the limited explanatory power of the expected income differentials for migration intensity. The neoclassical answer underlines that a gap between the average regional wage rates is not the only precondition for migration to take place. These are different valuations of heterogeneous traits of workers (including their education and experience) on labour markets that drive their relocation between regions. The New Economics of Migration (NEM) also suggests that difference in the average wage levels is neither necessary nor sufficient to explain cross-border movements. It hints at concerns of workers about relative deprivation or at benefits arising from a negative correlation of income risks between home and host markets, when the insurance sector in the former is poorly developed.

This paper contributes to the still relatively scarce empirical literature on the behaviour of emigrants in the following ways. First, previous findings on factors driving migration between regions are re-evaluated on the example of a medium-income European sending country. Second, the analysis focuses in greater depth on the labour market situation of individuals before emigration. It shows how the evolution of host labour markets, in terms of changes in institutional settings or demographic structure, may impact emigration trends from a country. Third, the experience of a gradual introduction of an open-door policy in the European Economic Area (EEA) is examined from a sending country perspective, complementing research conducted from recipient countries view by e.g. Pedersen and Pytlikova (2008). Finally, the paper documents the character of emigration from Poland, including the period after 2004. By its very nature, it revises evidence on the post European Union (EU) accession immigration from Poland gathered by Drinkwater et al. (2006) or Blanchflower et al. (2007) who use the UK and Irish data sources.

In the earlier studies on the subject, Lucas (1985) succeeds in confirming the predictive power of an expected wage gain and differences in employment chances between markets for initiation of internal and foreign migration (to South Africa) in Botswana. Vijverberg (1993), Herzog and Schlottman (1984) and Hunt and Mueller (2004) arrive at similar results studying internal migration in Cota d'Ivore (the first work) and migration between U.S. states and from the U.S. to Canada (two latter works). Massey and Espinoza (1997) indicate that although the expected income gap increases the likelihood of a cross-border movement of a worker it fails to explain a bulk of variation in Mexican-U.S. migration. In their analysis of data gathered in 25 Mexican communities (within the period 1987-1992) the expected income gain is not even a factor with the strongest explanatory power. The authors link individual acts of migration to a richer set of individual-, household-, community-, and macroeconomic-level predictors and

conclude that probabilities of the first, repeated and return migration appeared to be more strongly linked to social capital related factors then to cost-benefit calculations. Exploring the same data Haraguchi (2008) establishes that especially for repeated migrants knowledge about a host labour market and an earlier experience abroad (including the previous U.S. earnings) play a dominant role. Zaiceva and Zimmermann (2008) focus on emigration intentions of European workers before and after the EU enlargement in 2004. They find that a low job satisfaction, low earnings or being unemployed are relevant for workers mobility. However, non pecuniary factors like general attitude to moving abroad or family situation also play an important role while considering emigration. Neither is the individual labour market situation a major driver of European workers' internal migration, as suggested by studies of within-country migration intentions e.g. by Hughes and McCormick (1985) on the U.K. or Fidrmuc or Huber (2007) on the Czech Republic.

Macro-data evidence on the role of the relative income in triggering migration are also mixed. Mayda (2007) relates the intensity of immigration to 14 OECD countries (between 1980 and 1995) to a set of variables describing economic situation in source and host regions, to a distance between them, and to a range of demographic and cultural factors. She shows that the variation in the average income in host economies has a significant effect on immigration intensity. However, GDP in source countries is only weakly correlated with emigration rates. A similar analysis of aggregate immigration flows is also conducted by Parkih and Van Leuvensteijn (2002) for Germany, Mitchell and Pain (2003) and less formally Blanchflower et al. (2007) for the U.K., Borjas (1987), Clark et al. (2007) for the U.S..

Responses of workers to economic incentives may be influenced by immigration policies in host countries. Most obviously, immigration restrictions have an impact on the selection of immigrants as well as on their fallback position on a host labour market (Lozano and Lopez, 2010). Further, the choice of a job can be related to the legal status of an immigrant. Taylor (1992) and Walters at al. (2006) show that legal status is highly correlated with immigrants' choices of skilled and unskilled jobs in the U.S. agricultural sector. Lozano and Sorensen (2011) extend the analysis for other sectors employing Mexican immigrants. Thus, a legal status does not only affect wages via the bargaining position but also indirectly, via occupational choices. Mayda (2007) documents that if immigration policies are more restrictive (e.g. immigrants quota are binding) the impact of push and pull factors on workers flows is reduced.

In this paper an inference about factors driving migration is based on data from the Polish quarterly household survey. The survey consists of two questionnaires. A household questionnaire asks information on household composition and basic characteristics of its members. It covers all permanent households members, also those who at the moment of an interview stayed abroad for more than two months – temporary emigrants. A Labour Force Survey (LFS) questionnaire focuses in turn on labour market activities of actual residents of a household. Merging information from the two questionnaires it is possible to collect details on individual attributes and labour market performance of future emigrants.

To compare prospective emigrants and stayers I use a probit model. Identified flows of workers to emigration or on a home labour market between two consecutive quarters are regressed on a range of push and pull variables. These are selected to capture individual earnings opportunities

(education and job experience), the family situation, access to immigrants networks and sources of non-labour income. A detailed decomposition of the labour market status before emigration is pursued to account for possible differences in the emigration propensity of workers employed in diverse jobs, unemployed or staying out of the labour force. Next, regressions include indicators for business cycle developments in Poland and on host labour markets, and a measure of the restrictiveness of immigration policies in destination countries.

The influence of liberalization of immigration policies on emigration rate in Poland is distinguished from its effect on destination choices of Polish workers. This distinction is present also in a study of the effects of open-door policies introduced in the EEA countries after 2004 by Pedersen and Pytlikova (2008). They run difference-in-difference analysis on immigration flows from the New Member States (NMS) to the Nordic countries and arrive at a conclusion that the liberalization of the policy has had a positive effect on the magnitude of these migration flows, but less so on their redirection in favour of the open-door countries in the sample. In fact, almost all the „old" EEA member states eased the access of the NMS workers to their labour markets after 2004, but too differing degree. Here, traditional destination countries of Polish workers are grouped into countries that eventually opened up their borders after the Polish accession to the EU and before 2010 (open-door countries) and those which kept a significant share of immigration restrictions in place. Events of emigration to the eventually open-door countries as opposed to emigration to other developed countries are again regressed on the relative income and unemployment in the regions and a measure of immigration policy shifts.

The paper starts with the description of the data used. The second section discusses estimation methods and the empirical specification of the model. The third and fourth parts report the results. The following section comments on changes in the emigration trends observed on the macro level with reference to microeconomic results reported earlier. The last section concludes.

2 Data

2.1 Polish Household Survey

The Polish household survey is carried on a quarterly basis since May 1992. In the second quarter of 1993, a fixed households sample has been replaced by a rotation scheme with four rotation groups. Since then, each sampled household is interviewed twice for two consecutive quarters with half a year break between series of interviews. In the second and third quarters of 1999 the survey was not conducted and was resumed in the last quarter of 1999 with further changes in the sampling design. Since then, interviews are run continuously in all weeks of each quarter and not only in its middle week. There was also a shift in a share of households sampled in rural areas.

The household survey consists of two questionnaires. A household questionnaire contains questions on a number and basic characteristics of persons permanently resident in a household. The information on individuals collected on the basis of this questionnaire includes their age, gender and relation to a household head. The questionnaire distinguishes between actual residents of a household, persons who are for more than two months residing in an institutional household and persons who for more than two months remain abroad. The last category of permanent households' residents is further referred to as temporary emigrants or simply emigrants.

Information on persons who permanently reside in a dwelling but do not live in it for more than two months is usually reported by actually resident members of their household. It implies, that a person who moved out either with all her family or was single before leaving, is less probable to be covered by the household survey sample. The presumption is supported by a significantly lower share of households with all members abroad in the household survey data than in the Population Census in 2002 (PC2002). The PC2002 share is used as a reference estimate because the census captured all Polish citizens who were temporarily abroad (according to definition used in the household survey) in the spring months of 2002.

A second questionnaire (LFS questionnaire) includes questions on economic activity of actual residents of households who are older than 15. It is used to divide actual residents of Poland into three groups: employed, unemployed and labour market non-participants.

As the survey tracks households and their members (twice) for two consecutive quarters, the data gathered may be employed to identify flows of persons between labour market states or between Poland and foreign countries at quarterly frequency. A quarter-to-quarter change in the labour market state by a person can be singled out particularly easily. A unique identifier is assigned to each household and used in both questionnaires in all survey waves when a dwelling enters a sample. A similar unique identifier exists also for each actual resident of the sampled household. To identify flows from any labour market state to emigration, information from both questionnaires is required. Regrettably, before 2004, emigrant households members were indexed independently from actual residents in the same household. Hence, to calculate flows to emigration before 2004 records of actual residents from the LFS questionnaire are (,,fuzzy") matched with records of temporary emigrants created on the basis of the first questionnaire conducted one quarter later. The set of variables explored to match observations encompasses

a unique household identifier, gender and detailed date of birth of a person (when available, for some years only year of birth could be used)[1]

2.2 Sample

The period under consideration spans from the third quarter of 1994 to the second quarter of 2009 with a break for 1999. The first quarters when the survey started to be conducted are excluded from the sample due to missing information on some exogenous variables used in the further analysis. Almost 1.3 Mio. quarter-to-quarter flows between labour market states and emigration for persons in the age between 18 and 64 can be identified in this period[2]. Out of these flows, only observations on the last change of a state by each person are kept in the sample[3]. Around 200 more recorded inter quarters flows are dropped because of incomplete information on explanatory variables. Finally, around 3% of flows to emigration to unknown destinations or to countries traditionally attracting only very few Polish workers as indicated by the PC2002 are left out of the sample[4] are left out of the sample.

The final sample covers over 612 thousand observations of flows which were initiated in the period from the third quarter of 1994 to the second quarter of 2009, with almost 0.2% share of emigration flows. The latter include events of emigration to all EEA countries excluding Poland, developed Asian countries (Japan and the South Korea), the U.S., Canada, Australia, the New Zealand and Israel. Temporary migration to these destinations accounted for around 98% of temporary migration in the PC2002. A migration hazard variable is coded zero for flows between two labour market states and one for flows to any of the distinguished recipient countries.

The low share of emigration as compared to no-emigration events originates both in factual rareness of movements of workers abroad and in their undersampling. Most importantly, under-reporting of temporary emigration events is likely to be non-random. The non-random selection can result in biased estimates of regressions' coefficients and is therefore directly addressed at the stage of specification of empirical models. Migration of all household members (be it emigration of a single person or a family) is the least probable to be captured in the data. As migration of all household members always involves the departure of a household head, one can easily conclude that emigrating breadwinners are the most likely to be overlooked by interviewers. Applying similar logic, emigration of a spouse is not registered in the data with a greater probability than emigration of an adult child of a household head. Thus, information on the status in a household is a good candidate for a control variable for emigration propensity regressions, which supports consistency of estimates of their coefficients. Accounting for this information in the emigration regressions is aimed solely at guaranteeing unbiasedness of their coefficients and

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[1]The spurious matching error of the employed matching technique is measured as the probability of a false match of observations of actual households residents who can be identified on the basis of unique identifier. It remains significantly below 1%.

[2]These do not include the return migration flows (transitions from foreign labour market back to home labour market) and observations on persons who stayed in emigration between two survey waves.

[3]A person could enter the sample of calculated flows up to two times (once for the first two waves after sampling of a household and for a second a half a year later).

[4]Limiting the sample to flows to emigration to a group of developed countries is undertaken with a view to facilitate the calculation of the relevant host labour market indicators (wages and unemployment rates).

less so at assessing the role of the status in a household for a factual emigration probability of an individual.

The rareness of emigration events in the data can by itself be also a concern. Traditional identification strategies applied to rare events data may underestimate the probability of a positive outcome. The root of the problem lies in the fact that for rare events in finite samples, even when the total number of observations is high, the distribution of positive outcomes (in the case at hand emigration) may be poorly identified. A great share of collected observations is used instead to identify the distribution of non-events (staying decisions). The implied cut-off point up from which predicted values of a latent variable are indexed as ones may then be shifted to the right as compared with the corresponding threshold for actual observations (King and Zeng, 2001). The sample used here, with over one thousand observations of emigration events seems sufficiently large to alleviate the related criticism[5]. However, low number, next to non-randomly missing observations, of emigration events speak for cautious interpretation of estimates, especially of the average emigration probability in the population.

Table 1 describes emigration flows by major destination countries. The countries are split into two subsamples: countries that eventually introduced an open-door policy after 2003 but before 2010, and countries running more restrictive immigration policies before 2010. The former group is referred to in the text, imprecisely but short, as open-door countries and the latter as closed-borders countries. The countries that eventually loosened up immigration restrictions for workers from the NMS attracted over 50% of all temporary emigrants in the sample (over the period from 1994 to 2009).

On the basis of the division, an emigration direction variable is defined as a dummy which takes value of one for emigrants to the eventually open-door countries and zero for flows to other economies. Importantly, workers flows to countries like the U.K. or Italy are coded as ones also before open-door policies were introduced there[6].

Figure 1 plots changes in the unconditional probability of emigration and the fraction of emigrants who left for the open-door countries. From 1994 to 2002 the fraction of emigration flows in the data is low and relatively stable. In 2003 there is a sharp increase in the share of emigration events that continues until 2006. Some moderation in emigration outflows takes place only in 2007 and is followed by a sudden drop in the share of emigrants in 2008 and 2009.

A closer examination of the composition of emigration flows proves that an increase in their number after 2004 can be attributed mainly to higher outflows of Polish workers to the open-door countries. The fraction of emigration flows to the closed-borders countries is, in turn, more

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[5]In fact, methods to correct possible bias resulting from this sample structure recommended by King and Zeng (2001) and related to the literature on estimation in finite choice-based samples (Cosslett, 1981) could not be applied. They would require either a priori knowledge of emigration probability (in total population) or augmenting the existing sample with additional observations of emigration flows. In circumstances where emigration probability in population is difficult to approximate and sample structure is predetermined, the greatest efficiency of estimation can be achieved using all available information.

[6]Given that Polish emigrants are faced with multiple destination choices the first best approach would be to extend the framework to multivariate models where a dependent variable could be coded for each country separately. Instead, the data are pooled into two groups, due to limited number of observations of emigration in the data.

or less constant. The sudden drop in the fraction of emigrants in the sample in 2008 brings the share back to its pre 2003 levels but leaves their structure unaffected. The share of emigrants choosing open-door countries remains noticeably higher after 2008 than before the date of the Polish accession to the EU.

2.3 Emigrants and Stayers

Table 2 summarizes the basic characteristics of persons who enter the sample. The average age of individuals covered by the sample is close to 39. Roughly half of them are females. Almost 11% have at least higher education, 25% post-secondary, 9% only secondary and a further 33% vocational education. Future emigrants distinguish themselves as being on average younger (with the average age under 31), better educated and more frequently male (61%) than female. Over 8% of all persons were full time students (or pupils) at the time of an interview. The fraction of future emigrants remaining in education is slightly lower than the corresponding share of upcoming stayers. The share of persons with no job experience is in turn significantly higher for prospective emigrants than for stayers (38% as compared to 27%).

66% of individuals are married. The average number of dependent children under 5 years is 0.14 and above 4 years 0.43[7]. In general, upcoming emigrants were less likely to have family commitments as indicated by their lower marriage rate and fewer dependent children.

As concerns the labour market status, 60% of all workers in the sample are employed and 10% unemployed. Out of all employed workers, 11% were self employed, over 11% were self-employed in agriculture[8], 62% stay in dependant employment on permanent contracts and a further 11% on temporary contracts, nearly 5% are helping family members. Prospective emigrants stand out as being more frequently non-employed or employed only temporarily and as helping family members. An inferior (on average) position of future emigrants on the labour market is confirmed when looking at their occupational status before departure. Even though the share of future emigrants employed at low-skilled jobs is close to the corresponding share of stayers, the former are strongly overrepresented in jobs requiring only limited qualifications (as farmers, gardeners, foresters, fishery, industry workers, craftsmen, appliance and machines operators). Emigrants are significantly less frequently recruited from jobs in government administration or in managerial positions (2.2% as compared to 6.2% of stayers), in specialist, technician or other middle level positions (9.9% versus 22.5%). Fractions of persons employed in services, trade or as office workers is almost equal in emigrants' and stayers' subsamples.

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[7]From 2003 dependent children of a person are identified as minors in the same household for whom the person was indicated as a mother or a father in an interview. From 1994 to 2002 it is assumed that the oldest woman and man in a family (within the same household) respectively mother and father all children within this family. Changes in identification method result in changes in information provided in the survey. Before 2003 individuals within a household were subclassified into families but no other information on ties between family members was provided. After the date, households members are no longer split in separate families, but in turn information on family linkages between household members is available.

[8]The category of farmers is distinguished as persons who declare to be self-employed and receive income from an agricultural production.

The share of emigrants originating from rural areas (with less than 10 thousand inhabitants) is significantly higher than the equivalent share of all workers in the sample (58% versus 48%). The share of workers who move abroad from cities (towns with over 100 thousand inhabitants) is proportionately lower. Therefore, differences between in quality of jobs between prospective emigrants and stayers can be partly attributed to generally worse employment opportunities in rural areas than in cities.

The incidence of receiving permanent benefits (retirement or disability allowances) is markedly higher for upcoming stayers than for emigrants. On average, stayers benefit as well from a higher and more secure total household income. The share of adult and actually resident household members with constant income source[9] is higher in households of stayers (70% versus 55% for emigrants). Proportion of future emigrants receiving unemployment benefits is, in turn, higher than similar proportion of non-emigrants. It may be tied to the fact that unemployed who emigrated had searched for a job for on average shorter period than other workers (as indicated by respective shares of short-and long-term unemployed in the subsamples [10]). As such, they were more likely to fulfil unemployment benefits eligibility criteria.

Finally, future emigrants have clearly better access to information about foreign labour markets than stayers: the average number of emigrant members in their households is seven times higher than in households of stayers. They are also more likely to come from regions with higher emigration rate in 2002 (calculated on the basis of the Population Census data).

Summarizing, the statistics suggest that prospective emigrants have on average better education but less working experience and generally weaker labour market attachment than stayers. Before departure they are relatively frequently unemployed or employed at positions of low status or a temporary character. They also seem to be more mobile due to weaker family ties and better access to information about job opportunities abroad.

2.4   Situation on Foreign Labour Markets

The average income gain of a temporary emigrant is approximated by a ratio of the average after tax wage in destination countries to the average net wage in Poland, both expressed in EUR. Data on the average wages, exchange rates stem from the European Commission database (AMECO). Information on the tax wedge is taken from the OECD and Eurostat. For some countries (foremost for Israel and Switzerland) information from the above mentioned sources is supplemented with data from national banks and national statistical offices.

It is assumed that workers' preferences for different destinations, including all financial and social considerations, can be represented by the constant returns to scale Cobb-Douglas utility function. This simplifying assumption allows to overcome difficulties tied to measurement of the expected gain from cross-border movements under imperfect observability of (changes in) financial and social costs of migration to different destinations. Time-invariant coefficients of the function are chosen so that the ratio of any two elasticities corresponding with different

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[9]The constant income source is defined as either income from work or retirement and disability benefit.

[10]Short-term unemployed are defined as unemployed who look for a job for no more than a year. Other unemployed are classified as long-term unemployed.

destinations is equal to the ratio of wage funds of Polish immigrants to these countries. The relevant wage funds are established on the basis of the data on the average after tax wage levels in EUR (in the period 2000-2002) and a number of temporary migrants (remaining abroad for 2 to 12 months) in 2002 to a destination as in PC2002. These Cobb-Douglas weights, summarized in Table 1, are used to calculate the average relative income in host countries, and in open-door and closed-borders countries separately.

Figure 2 compares time trends in the relative income in recipient countries. Systematic convergence of Polish wages to ,,Western" levels is reflected in a continuous fall in the relative nominal income until 2005. The period until 2005 also features a steady increase in wages in open-door countries as compared to other emigration destinations. Hence, other things equal, open-door countries were a more attractive destination at the end of the period under consideration than at its beginning.

Similar procedure and data sources are employed to derive the average unemployment rate in recipient countries. Figure 3 illustrates time trends in the average unemployment rates in all destinations, open-door and closed-borders countries. The average unemployment rate oscillates between 7% and 8% reflecting, with a lag, business cycle fluctuations of GDP in developed economies. The stability of the average unemployment rate abroad hides a steady reduction in unemployment rates that continued until 2007 in the eventually open-door countries. This factor could as well have contributed to redirection of emigration flows from Poland to these directions.

Effects of gradual liberalization of immigration policy in the EEA member states are measured with an open-door variable which takes values of zero before the second quarter 2004 and is assumed to take a value of one when all member states (as at the end of 2004) adopt a free movement of labour. Its intermediate values correspond to a fraction of the total EEA population or GDP (as for 2004)[11] accounted by countries which were in the reference period open to the NMS citizens (compare Table 1). The variable is illustrated in Figure 1.

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[11]GDP at market prices provided by Eurostat with basis prices and exchange rates from 2000 is used.

3 Model

3.1 Formulation of the Problem

In the basic framework, an individual faces two prospects: staying in her home country or moving abroad. On the home labour market a worker expects to acquire utility u_H and abroad u_F. The utility level on each labour market depends on employment status, wages and costs of cross-border movement. It is assumed that information on these may be summarized by a set of individual characteristics, including education and labour market experience, and market-specific variables. All the relevant variables are contained in a vector x. For an individual i the utility levels are described as:

$$u_H(i) = \alpha_H x(i) + \epsilon_H(i) \tag{1}$$

$$u_F(i) = \alpha^F x(i) + \epsilon_F(i) \tag{2}$$

where ϵ_H and ϵ_F are randomly distributed with zero mean. α_H and α_F are vectors of model parameters. Elements of these vectors may in particular take a zero value for some of independent variables. The expected gain from emigration y^* equals $u_F - u_H$ and is represented as:

$$y^*(i) = \alpha x(i) + \epsilon(i) \tag{3}$$

where α is a vector of parameters (equal to $\alpha_F - \alpha_H$) and ϵ is a normally distributed error term (again commensurate with $\epsilon_F - \epsilon_H$). A decision to emigrate will follow only if y^* is greater than zero. For normally distributed y^* the dichotomous decision process is described by a probit equation of a following form:

$$y(i) = \begin{cases} 1 \text{ if } y^*(i) > 0 \\ 0 \text{ if } y^*(i) \leq 0 \end{cases} \tag{4}$$

where y is a categorical variable taking value of 1 if an individual emigrates and zero if not.

The problem of choosing between two destinations may be outlined analogously. An emigrating worker chooses between countries with open borders (denoted by A) and countries running more restrictive immigration policies (denoted by B). In region A utility of an individual is u_A and in B u_B. Utility levels are again dependant on the vector x. The utility gain when an individual emigrates to an open-boarder instead of to the closed-border country defines the latent variable $z^* = u_A - u_B$. However, decisions about destination are observed only for emigrants therefore only when the earlier condition $y^* > 0$ is fulfilled. The destination choice is described as:

$$z(i) = \begin{cases} 1 \text{ if } z^*(i) > 0 \text{ and } y^*(i) > 0 \\ 0 \text{ if } z^*(i) \leq 0 \text{ and } y^*(i) > 0 \end{cases} \tag{5}$$

$$z_i^* = \beta x(i) + \varepsilon(i) \text{ if } y^*(i) > 0 \qquad (6)$$

where z is an indicator variable taking value of 1 if an individual emigrates for an open-board country. Vector β contains model parameters and ε is a random normally distributed disturbance.

If latent variables y^* and z^* are correlated, not accounting for endogenous selection into emigration may lead to biased estimates of β. On the basis of the simple model developed here $y^* = z^* + min\{u_A, u_B\} - u_H$. It seems sufficient to foster concern about correlation between the two unobserved variables of interest.

Lee (1982) and Vella (1998) provide a general overview of models dealing with selection bias. The method applied here refers to Heckman (1979) solution. The Heckman correction of the endogenous selection assumes normal distribution of latent variables. A violation of this parametrical assumption may lead to inconsistency of the maximum likelihood estimator. The main advantage of the method lies in its simplicity. In line with this approach estimates of the system (3-4) can be used to derived a Mills ratio for emigrants:

$$\lambda_{y=1}(i) = \phi(\alpha x(i))/\Phi(\alpha x(i)) \qquad (7)$$

where ϕ is the univariate standard normal density function and Φ the univariate cumulative standard normal distribution function. This variable may be next used as an additional regressor in (5-6). If the covariance matrix between ϵ and ε is:

$$\begin{bmatrix} \sigma_\epsilon^2 & \sigma_{\epsilon\varepsilon} \\ & \sigma_\varepsilon^2 \end{bmatrix} \qquad (8)$$

and $\rho = \sigma_{\epsilon\eta}/\sigma_\epsilon^2$ denotes the correlation coefficient, then the equation corresponding with (5-6) gets a form:

$$z(i) = \begin{cases} 1 \text{ if } z^*(i) > 0 \\ 0 \text{ if } z^*(i) \leq 0 \end{cases} \qquad (9)$$

$$z_i^* = \beta x(i) + \rho\lambda_{y=1}(i) + \varepsilon(i) \qquad (10)$$

3.2   Empirical Specification

The emigration hazard variable is in the first line explained by personal characteristics of individuals including their gender, age and education. Age and education are important determinants of wages and employment chances. Other things equal, better educated workers with longer work experience (which is usually positively correlated with age) can expect higher earnings on both home and host labour markets. However, differences in returns to similar skills on two labour markets or limited transferability of education and experience can introduce further variation in the expected gains from migration. For example, limited transferability of skills tends to

discourage emigration of better educated or more experienced persons proportionately stronger (Friedberg, 2000, Chiswick and Miller, 2007). By contrast, the alternative costs of movement, tied to abandoning current and future returns on some already accumulated but market specific skills, should be lower for younger workers. As career patterns and wage profiles may differ for persons with various education level, next to education dummies and the age variable, the regressions include a set of interaction terms between these. Next to those, an additional dummy indicating whether a person had any job experience at the time of an interview is added to a set of explanatory variables to complement information about job experience of a person.

Individual characteristics inform also about the phase in a worker's life-cycle, her cost of adaptation to a new labour market and risk averseness. Matchin et al. (2008) using an example of Norwegian school reform indicates at a positive impact of general education on workers' mobility. Higher level of education may be correlated with better knowledge of foreign languages, open-mindedness or ability to learn. Integration into a new environment seems easier for young and they are able to reap economic benefits from human or social capital investments over longer period of time. What follows, the younger is a person, the higher should be her emigration propensity. Persons remaining in full time education are young and can be reasonably expected to share some common traits with better educated workers, all of which favor their higher mobility. On the other hand, moving abroad may interrupt education path of full-time students raising their total costs of emigration. Hence, a relative willingness of students to emigrate is ambiguous. It is established on the basis of the data via addition of a full-time student dummy to a set of independent variables in the emigration propensity regressions.

Family ties raise pecuniary and non-pecuniary costs of emigration (Sandefur and Scott, 1981). An emigrating partner or a parent faces choice between taking family with her or bearing costs of the separation. In the regressions family status of a person is represented by her marital status and information on a number of dependent children up to 4 years and a number of older ones.

A full range of variables accounted for in the emigration regressions describes labour market status of an individual. Having a job is expected to dampen willingness to move abroad, both in line with the neoclassical and the NEM view. The negative impact of having a job on emigration propensity is supported by empirical evidence on e.g. interstate U.S. migration gathered by Schlottmann and Herzog (1984). The NEM underlines security and social prestige of a job as important determinants of work satisfaction. In this vein, the impact of occupational status on the emigration probability is empirically tested by Constant and Massey (2003). Here, the propensity to move abroad is related to a type of a working arrangement (temporary, permanent and self-employment) and a type of occupation (low-skilled and semi-skilled jobs, office and services jobs, specialist positions, management and administration positions).

Neither Ahn et al. (1999) for Spanish nor Fidrmuc and Huber (2007) for Czech workers find significant differences between short- and long-term unemployed as regards their willingness to accept a job in other regions or declared propensity to migrate, respectively. To test generality of these results for Polish workers, short- and long-term unemployed are set apart in the estimated models.

Aside of variables summarizing individual labour market status, regressions include the regional unemployment rates. The unemployment rate is expected to be negatively correlated with the average wage rate in the region and approximate impact of local earnings opportunities on workers' readiness to emigrate. The aggregate unemployment rate appears to have explanatory power for predicting emigration on micro (e.g. Fleisher, 1963, Ramos, 1992, Castillo-Freeman and Freeman, 1992, for Puerto Rican migration to the U.S.) and macro level. However, the positive effect of the unemployment rate in a great share of these studies captures not only the attractiveness of local wage offers but also employment chances. Important to notice, as in this study an individual labour market situation is controlled for separately, justification for adding (and interpretation of) the regional unemployment rate to a set of control variables is narrower than in the studies mentioned above.

Non-labour income, similarly as earnings, should inhibit emigration willingness of an individual. Ahn et al. (1999) indicate that migration intentions are less common among recipients of unemployment benefits. Herzog and Schlottmann (1984), in turn, fail to find a robust influence of welfare transfers on migration. To verify to whether non-labour income impacts emigration propensity of Polish workers, a set of dummies which take non zeros values for recipients of retirement, disability and unemployment benefits, respectively, are added to regressions. Next to those, to account for plausible pooling of income between household members, a variable measuring the fraction of household members with constant stream of income is included (where constant income source is understood as wage, income from entrepreneurial activity, retirement and disability benefits).

Access to information about foreign labour markets and presence of informal networks in destination countries improve employment chances of an emigrant and cushion her social cost of migration (i.e. via provision of ethnic products and services). Importance of networks might be particularly high for low-skilled workers and poor native speakers (Hellerstain et al., 2008). In the regressions a positive impact of access to networks on the emigration propensity is assessed by including a number of other household's members being abroad (similarly as in Palloni et al., 2001) and the intensity of emigration in the region measured as a ratio of return migrants to population in 2002.

A set of dummies enables to distinguish between countryside, medium and large towns. Regional dummies capture the regional variation in the emigration propensity other than variation reflected in the regional unemployment or emigration rates and degree of urbanization. As well-developed regions, with schools, roads, and banking institutions, proportion of women employed can offer better investment opportunities, the regional dummies can inter alia account for the expected rate of return on invested savings accumulated abroad in a region. Especially, when regional investment opportunities are not directly linked to other explanatory variables.

The state of foreign labour markets in the emigration propensity regressions is depicted by the average after tax wage in benchmark destinations relative to after-tax wage rate in Poland and the average unemployment rate abroad. The hypothesis that launching an open-door policy by the former EEA countries (via reducing cost of emigration) encouraged more emigration flows from Poland is tested by adding an open-door policy shift variable.

Last but not least, all regressions describing selection into emigration are controlled for under-representation of joint family emigration events in the data (compare: the previous section). It is done by supplementing a set of independent variables with status in a household dummies and a dummy that takes positive value if a person lived alone at the time of an interview (one person households).

The relative propensity to emigrate to the (eventually) open-door countries against the closed-borders countries, is explained by the relative wages and the difference between unemployment rates between the two regions. Similarly as in the emigration propensity regressions, variables describing personal attributes capture an influence on destination choices of income and employment factors, which are not accounted for by the aggregate labour market variables but tied to heterogeneity of skills and differences in returns to them on labour markets in the two groups of countries. Constants in the destination regressions represent all factors that encourage or discourage emigration to open-door versus closed-borders countries and are time invariant. These may include differences in labour market institutions, cultural patterns between the two regions, relative strength of network effects or knowledge of languages spoken in the region in Polish population. The destination regressions are also tested for significance of non-random selection of emigrants by inclusion of the Mills ratios derived on the basis of the emigration propensity regressions.

The open-door variable is included the destination choice regressions to evaluate the impact of an open-door policy on redirection of Polish emigration flows. A regressions parameter for the open-door policy variable corresponds with the marginal change in the probability to emigrate to open-door countries net of other effects tied to host and home labour markets developments. Hence, the approach taken may be loosely interpreted as a variant of a difference-in-difference analysis.

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4 Results

4.1 Individual Traits and Emigration Propensity

Estimates of the emigration regressions are reported in Table 3. The first regression from the left links emigration propensity to a set of individual characteristics, home labour market factors and to a set of yearly dummies covering the sample period. In the second regression, yearly dummies are replaced by measures describing the situation on host labour markets, namely the relative nominal income net of taxes (in EUR), the unemployment rate abroad and the open-door policy variable. Otherwise, it resembles the first specification. The last two regressions include all indicators included in the second regression but a richer set of variables describing individual labour market situation of a worker. Standard errors of all parameters' estimates are calculated on the basis of variance-covariance matrices with clustering of observations within households. The clustering accounts for possible interrelations between emigration decisions of household members (Rabe, 2006).

The benchmark person in each reported regression is a male, with at most primary education and some job experience. The person stays out of the labour market but is in full time education. He is not married, has no dependent children and no permanent income source. Finally, he permanently resides in a dwelling in a rural area and shares a household with at least one other actual resident but no temporary emigrants.

According to the results, men have generally a higher propensity to emigrate than women – estimates of parameters on a female dummy are negative and statistically significant at 1% confidence level[12]. Patterns of emigration within the life cycle differ between persons with higher education and other education levels. Interestingly, age patterns of emigration for workers with primary, vocational, secondary or post secondary education are already similar. Changes of the emigration propensity with age for a primary and a higher educated person are plotted in Figure 4. The figure illustrates the predicted probabilities of a movement at different age for a non-single person who is neither a head of household nor her partner[13] (when formulating predications values of all other explanatory variables are taken as their sample averages). As may be read from the graph, Poles with a university degree are generally more probable to emigrate than their peers with lower education. Their willingness to move decreases from the age of university graduation (assumed to be 24) and stabilizes only at the age of 45. For a person without higher education (represented by a worker with primary education), emigration propensity peaks at the age around 30 and sharply falls thereafter.

A plausible explanation of the diverse age-emigration patterns of workers with differing educational attainment is a strong complementarity between an education level and a job experience on the home labour market combined with a limited degree of cross-border transferability of the latter. The interplay of the two forces results in decreasing in job experience (approximated by age) gains from emigration for persons with a higher education. The limited transferability

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[12]Further in the text, a variable is commented as having an impact on an outcome variable when its insignificance can be rejected at below 10% confidence level.

[13]Also other predicted probabilities presented in the paper are calculated for non-single person who is neither a head of a household or her spouse.

of job experience is additionally supported by the statistically higher propensity to emigrate of persons with no previous labour market experience.

Students appear to be less likely to emigrate than workers who are no longer in full time education. At the first sight, it stands in contrast with results from studies based on data from receiving countries (e.g. Drinkwater et al., 2006) that students constituted a substantial share of the post-accession emigration from Poland. The discrepancy between outcomes comes possibly down to the fact that authors working on immigration data generally do not distinguish between full and part time students. Being a parent also lowers propensity to emigrate, the more so the younger are children. Interestingly, marital status has either weak or no explanatory power in the regressions, while they are controlled for parental status. And finally, non-employed recipients of disability or retirement benefits display lower emigration hazard than non-recipients. The last relation backs up a significant role of the welfare state in shaping mobility preferences of its citizens.

The estimates support the existence and the significance of network effects. Presence of other migrants in a household and a more general measure of emigration-related social capital, namely the emigration rate in a region in 2002, both raise the emigration propensity of workers.

4.2   Role of Labour Market Situation in Poland

As indicated by the estimates of the first two regressions in Table 3, employed are less willing to emigrate than non-employed. Further, there are no clear-cut differences in the propensity to emigrate between those unemployed and searching for a job and those staying out of labour market. For otherwise similar workers, the predicted probability of emigration doubles when a person is non-employed (for employed the predicted emigration probability amounts to 8‰and for non-employed to 16‰). The next two regressions in Table 3 distinguish between different forms of employment as well as between shorter and longer duration of unemployment. A hypothesis that these specifications can be nested without a loss of information in the second specification, with less detailed treatment of a labour market situation of a worker, is rejected by likelihood ratio test at below 1% confidence level (with χ^2 statistics of 89.18 with 5 degrees of freedom for the third regression and 139.53 with 9 degrees of freedom for the fourth regression)[14]. The corrected R^2 square statistics and the information criteria (AIC and BIC) reported in the lower rows of Table 3 sustain that the extended specifications fit data better.

A closer investigation into the employment status of a worker suggests that not only job position but also its stability and quality have an effect on her decision to emigrate. Employees on permanent contract and farmers emigrate least frequently. Estimates of the third specification suggest that self-employed (in the non-agricultural sector) are also relatively unwilling to emigrate. Still, the emigration propensity of helping family members and employees on temporary contracts is not significantly lower than that of non-employed. In terms of predicted probabilities (for the average worker in the sample), a chance of emigration of an employee on permanent

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[14]The hypothesis that emigration risk of all types of job holders is equal can be rejected at below 1% confidence level (χ^2 statistics for the third and the fourth regressions are 82.40 with 4 degrees of freedom and 133.45 with 8 degrees of freedom, respectively). For duration of search the equality hypothesis can be rejected at 5% level (with χ^2 statistics of 6.09 with 1 degree of freedom) for the both regressions.

contract is equal to 5‰and for a self-employed or a farmer to around 10‰. Further, the esti-mates of the last regression in Table 3 are consistent with emigrants being only seldom recruited from managerial, administration or specialists jobs, and relatively more frequently from jobs where less skills are required. While occupation dummies are present in the specification, the self-employment dummy loses its significance. Thus, the lower propensity to emigrate character-izing self-employed results chiefly from the fact that on average they occupy jobs of higher social prestige. The town dummy becomes insignificant when the employment dummy is replaced with a set of dummies distinguishing between different employment types[15]. Its significance in the first two specifications turns out to result from a higher share of employees on permanent con-tracts residing in towns than in rural areas. The result that workers from highly urbanized areas emigrate less frequently than others is, in turn, robust across all the specifications. Plausibly cities offer better job prospects than rural or even smaller towns areas.

In general, the regressions estimates suggest that are no pronounced differences in individual emigration propensity between unemployed and non-employed. Only two groups of unemployed may be marginally more reluctant to move abroad than non-participants: unemployed workers who receive unemployment benefits or who have been searching for a job for an extended pe-riod. The slightly lower willingness to emigrate of unemployed workers receiving unemployment benefits corresponds well with the negative relation between availability of non-labour income sources at home and intensity of job search activities, including looking for a job abroad. How-ever, the lower emigration propensity of long-term unemployed is more likely to originate in a commonality of unobserved traits which hinder both employability in Poland and cross-border mobility (such as e.g. a high psychological costs of job search) among members of the group.

In the data (compare Table 1), the fraction of emigrating unemployed is higher than that of non-participants (compare Table 1). The apparent dissonance between the sample fractions and the regression results concerning the propensity to emigrate of unemployed and non-participants comes down to a significantly higher share of full-time students and lower share of those without any working experience among non-participants. Unemployed have on average a higher propen-sity to emigrate because they are less tied to the home country than non-participants, either by educational duties or already acquired job experience.

The local unemployment rate enters all but the first regression significantly and positively. Hence, it is not only the individual labour market situation of a worker but also general labour market conditions that matter for an emigration decision.

4.3   Impact of Host Labour Markets Developments

Differences in individual traits such as age, education, family and labour market situation can well explain differences in the emigration propensity between Polish workers in a cross-sectional dimension. Still, changes in the population structure and developments on the source labour

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[15]Separate (not reported) regressions with a set of explanatory variables including either only detailed infor-mation on employment type or on unemployment duration were run for the purpose of checking the information content of these sets of variables in relation to other variables included already in the first two specifications (com-pare the previous footnote). On this basis, it is possible to establish which changes in specifications contributed to a reduction (or gain) in the explanatory power of other variables.

market seem insufficient to introduce the observed (and plotted in Figure 1) time variation in migration outflows, in particular between 2005-2007. To support the claim, two sorts of the predicted emigration probabilities are calculated on the basis of the estimates of the first regression in Table 3, where changes in the emigration hazard of Polish workers, other that these related to shifts in population structure or home labour market developments, are captured by the time dummies. Grey bars in Figure 5 stand for the predicted emigration hazard of a person possessing the average traits of workers surveyed in the reference year. It is worth mentioning, that a part of the variation explained by grey bars, in particular after 2003, can be attributed to strengthening of the immigrants networks after the initial post-accession wave of emigration. Black bars depict the predicted emigration probability of the same representative Polish worker by years. The time variation illustrated by the black bars originates solely in the different estimates of time dummies' parameters. A difference between the grey and the black bars comes down to evolution of demographic and economic factors in Poland over the sample period. The difference has relatively moderate magnitude and the black bars clearly still mimic the time pattern of the emigration propensity from Figure 1.

When the atheoretical yearly dummies are replaced with indicators of host labour markets developments, as in the second specification in Table 3, the goodness of fit and information content of the emigration hazard regression, as measured with the corrected R-square statistics and Bayesian criteria, falls only moderately. With reference to the same indicators, the regressions with detailed treatment of labour market situation before emigration of a worker (two last specifications in Table 3) already outperform the first specification.

The estimates of coefficients on the relative nominal income abroad are, across all specifications, positive and consistent with an increase in the emigration propensity by around 0.4‰ in response to a 1% higher level of foreign nominal wages, keeping all the explanatory variables at their sample averages[16]. The foreign unemployment rate enters all specifications negatively and the estimated coefficients correspond with an increase of 7‰ in the emigration probability in reaction to a reduction of foreign unemployment by 1% of active population (again keeping all other explanatory variables on their sample averages). Thus, the impact of the unemployment rate abroad on willingness to emigrate is overproportionately strong as compared to the wage level.

This result may originate from imperfect measurement of factors affecting the expected income abroad but also indicate at risk-averseness of Polish workers[17].

The variable summarizing a gradual introduction of an open-door policy by the former EEA countries after 2004 has a strong and significant impact on the emigration probability of Polish workers. The marginal response of the emigration hazard to an increase in the open-door variable from zero to 0.1 (and keeping all other explanatory variables at their sample averages) amounts to 2‰. On the aggregate, this translates to an increase of approximately 0.2‰ increase in the temporary emigration rate of Polish permanent residents in response to a loosening of immigration restrictions in 10% of all EEA labour markets. However, it is likely that the

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[16]The estimates of the marginal effects quoted in the paper, similarly like the predicted probabilities, are calculated for a person who represents neither a single household nor is a household head or her partner.

[17]For a risk-neutral agent coefficients on the foreign unemployment and the wages abroad should be equal.

open-door variable captures as well other than immigration policy factors which could have contributed to the intensification of emigration from Poland post EU enlargement. These may include a marked reduction in travelling costs tied to an expansion of the low cost carriers on the NMS markets or establishment of work intermediation firms recruiting workers on these to fill jobs in the ,,old'' member states.

The non-linearity of probit models in independent variables implies that a liberalization of labour movements regulations in the enlarged EEA can affect the linkage between the emigration intentions of Polish workers and developments on foreign labour markets. According to the estimates in Table 3, a response of the emigration hazard variable to a 1% increase in foreign wages evolves from 0.2‰to 4‰when the immigration policy variable ranges from zero (its pre-2004 level) to one (the free labour mobility across all the EEA states). At the same time, a change in the emigration propensity resulting from a 1 ppt. drop in the foreign unemployment rate goes up from 4‰to 69‰. Even recognizing the uncertainty tied to these calculations, these outcomes suggest that in Europe with fully integrated labour markets, the same variation in wages or employment chances in wealthier regions may trigger stronger responses of workers from Poland. More general, similar shocks affecting the ,,old'' EEA countries should result in greater adjustment via changes in labour force in recipient and sending regions.

4.4   Choice of a Destination Country

Regressions describing the choice of a destination country are reported in Table 4. Starting from the left, the first two destination choice regressions are controlled for the Mills ratio derived on the basis of the second specification of the emigration propensity regression specification as in the Table 3. The last two regressions include the Mills ratio calculated for the second extended emigration regression, namely the one presented in column 4 of the Table 3. Statistics summarizing a data fit of the models (LR, AIC and BIC) in Table 4 are presented for the system of the two-stage probits (and not for its second stage only).

The destination choice seem to be largely unrelated to the emigration decision. The Mills ratios do not enter any of outcome equation significantly. A hypothesis that there exist a correlation between two latent variables can be rejected with the corresponding LR test (two bottom rows of Table 4).

The relative nominal after tax wage is irrelevant for the destination choice, once the decision to emigrate has been already taken. Differences in the unemployment rates between recipient countries turn out to impact the destination choice. In fact, low time variation in the unemployment gap translates in very high estimates of its marginal effects the emigration direction of Polish workers. Namely, the probability of choosing one region over the other increases by 2.7% to 3.6% (depending on specification) in a response to a 0.1 ppt. change in the dispersion of unemployment rates in its favour (keeping all other explanatory variables at their sample average levels).

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[17]For a risk-neutral agent coefficients on the foreign unemployment and the wages abroad should be equal.

The open-door policy dummy is statistically significant across all specifications. The estimated positive effect on the probability to move to one of the open-door as opposed to the closed-borders countries, once the decision to emigrate has been already met, ranges from 4.7% to 5.3% (depending on specification) in response to a shift in the open-door policy variable from zero to 0.1. However, and in contrast to results on the emigration propensity, relationship between the difference in unemployment rates and prevalence of movements to each destination is only weakly affected by shifts in an immigration regime in one of the regions (and if anything, the more admissible immigration policy in the open-door countries, reduces response of Polish workers to relative employment chances in the two groups of recipient countries).

The second and the fourth regression in Table 4 include a range of demographic and educational characteristics of workers. A hypothesis that there are no systematic differences in destination choices between persons of different gender, age or education be rejected at 1% confidence level (LR statistics for the comparison of an information content of the first and the second regression is 90.85, and for the third and the fourth regression, 91.58; tests run with 17 degrees of freedom). Women are on average more probable to leave for the EEA member states which introduced an open-door policy anytime between 2004 and 2009. Young or prime-age workers with general (primary or secondary) or higher education more frequently move to countries which eventually liberalized their immigration policies. Countries keeping immigration restrictions in place until 2010, traditionally lure young and prime-age workers with professional education (post secondary or vocational) and with some working experience.

4.5 Robustness Check

In the period under consideration, the convergence of Polish wages to levels observed in traditional emigration destinations was significantly faster in nominal than in real terms. In regressions the economic gains from emigration are approximated by the nominal after tax wage gap between Polish and foreign labour markets. The choice of the nominal rather that the real wage differential hinges on a presumption that most of emigrants covered by the sample planned to leave abroad only temporary. Thus, a lion's share of desired consumption and investment goods should be purchased by them only after their return and at source country market prices. However, the data explored in the analysis are likely to cover also emigrants who already at the moment of departure endeavoured to stay abroad permanently, but simply failed to report that intention to a responsible administration unit. As for them gains in real terms should matter more, all the regressions are rerun with the wage differences expressed in PPS. Estimates of coefficients on the real relative wage in the emigration hazard regressions are higher than the corresponding estimates of coefficients on the nominal wage gap. It is a flatter time profile (lower time variance) of the former measure that plausibly underlies the difference between the estimates. The real wage difference between alternative destination countries does not enter any of the destination choice regressions significantly, similarly as corresponding nominal measures. Replacing the nominal with the real wage gaps has some moderate impact on estimates of coefficients on the unemployment rate abroad and the open-door policy measure in the emigration propensity, and on the difference between the unemployment rates in different destinations, in the destination choice regressions.

Using the open-door policy variable calculated on the basis of GDP shares of the EEA countries that revised their immigration policy toward the NMS citizens before 2010, instead of the one derived on the basis of corresponding population shares, does not markedly change estimates either. The estimates are only vaguely affected by weighting observations with the LFS population weights. While accounting for population weights, women and persons with postsecondary educations no longer seem to be particularly attracted to countries which eventually opened up their borders.

The other possible concern, is pooling of the EEA countries which delayed opening of their borders until 2010 with non-European destinations, in the closed-borders countries group. Greater distance, higher costs of movement, sharper cultural differences or distinct evolution of wages in non-European destinations are likely to set them apart from European countries in the group. To check whether the results are dependent on a selection of destination countries, or on the definition of the control group for evaluation of the effects of an open-door policy, the regressions are rerun on observations truncated to stayers and emigrants to the EEA only. Measures of relative income and unemployment rates are modified correspondingly. For illustration, estimates of the emigration propensity regression based on the third specification from Table 3 are reported in column 1 of Table 5. Analogous estimates of the destination choice regression are provided in the two first columns of Table 6. In contrast to the benchmark outcomes, marital status has a significant (and positive) influence on emigration propensity. The dummy for recipients of unemployment benefits looses, in turn, its predictive power. Once destinations accounted for in the control group consists of European destinations only, students appear to be more willing to emigrate to open-door countries and workers with no job experience choose countries in the both groups with a similar frequency. The effects of the unemployment rates on the destination choice seem weaker than in the baseline regressions.

To assure that each two observations in the data represent two distinct persons, the sample consists of the last registered quarter-to-quarter flows of workers. The alternative sample sharing the property is composed the first quarter-to-quarter flows. The sample redefinition limits the number of positive emigration outcomes to less than 800, which results in generally lower explanatory power of emigration and destination choice regressions (as indicated by R square, AIC or BIC statistics). In column 2 of Table 5 the re-estimated regression based on the third specification from Table 3 is provided as an example. The related destination choice regressions are included in two last columns of Table 6. As compared to the main results, long-term unemployed or recipients of unemployment benefits have an analogous, not lower, propensity to emigrate as other non-employed. Workers with postsecondary education, next to those with higher education, have a higher emigration propensity than persons with utmost secondary education. Estimates of the destination choice regressions change in a similar fashion as when the sample excludes events of emigration to non-European countries.

Robustness of results is checked also in respect to distributional assumptions about the latent variables. Estimates of logit models are much the same as these of the probit regressions with identical specifications. In opposition to the probit regressions, the logit models support a lower emigration probability of married persons.

Loosening the assumption of the sequentiality of emigration and destination decisions and allowing both decisions to be taken concurrently by a worker, does not change the main outcomes either. The reformulated problem is modelled with a multivariate nominal probit with three choices: staying (benchmark), emigrating to open-door countries and emigrating to closed-borders countries. Specifications of the multivariate probit regressions resemble the specifications of the emigration probits but are additionally augmented with wages and unemployment gaps between alternative emigration destinations. The estimates of the multivariate probit regression corresponding with the third specification from Table 3 are presented as an example in two last columns of Table 5. The estimates are broadly in line with outcomes from the emigration propensity probits: females, students, parents (especially of small kids), recipients of retirement or disability benefits or members of households with a stable income source are less probable to emigrate. Young or prime age workers with an access to immigrants networks and a weak home labour market attachment are in turn most willing to leave the country of origin.

The estimates of parameters on the open-door variable in the multivariate probits indicate that after 2004 emigration to both open-door and closed-borders countries intensified. The increase in emigration was more pronounced in direction of open-door countries. The relative income abroad and the average unemployment rate in host countries enter the multivariate regressions significantly and with the expected signs. Consistently with the earlier results, the difference in nominal wages between two group of destination countries remains insignificant. Relatively high unemployment rate in open-door as compared to closed-borders countries has a counterintuitive negative impact on the probability to leave for any of the two regions, even though it affects the emigration propensity in the former direction more substantially. The adverse effect of the relatively unfavourable labour market situation in open-door countries on the propensity to emigrate from Poland in general may indicate that preferences for open-door countries are in fact stronger than accounted for in the aggregate measure of the employment chances used. Country weights used in the calculation of the average unemployment rate abroad, anchored in PC2002 data, may imprecisely capture the relative importance of destinations.

To sum up, the key results are generally robust to changes in income and immigration policy shifts measures, a sample definition and a model specification. This is particularly true for the relevance of labour market situation of a worker before potential emigration and for the impact of liberalization of immigration policy on her emigration decision. Estimates which are less robust to modifications of the employed approach include the negative impact on the emigration propensity of long job search and eligibility for unemployment benefits.

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5 Some Comments on Aggregate Outcomes

5.1 Demography and Depressed Labour Market in Poland

The EU enlargement coincided with entering of the labour market in Poland by cohorts from the baby boom that started in 70s and ended at the beginning of 80s. Chances of finding employment by young, inexperienced workers are generally lower than that of prime-age workers, and it was so especially during the prolonged period of excessively high unemployment that came to an end only just before 2004. Hence, a commonly shared view is that the sharp increase in emigration after the EU accession, in particular as compared to the Czech Republic or Hungary, was supported by these demographic developments.

In fact, changes in the demographic structure of Polish population alone are not a satisfactory explanation for observed trends. The estimates of emigration regressions indicate that the emigration propensity is the highest before the age of 44, and particularly high before the age of 34. The share of workers between 18 to 44 in Poland was systematically falling from 1994 to 2009 (28% to 20%) and the share of workers under 34 remained more or less constant (around 21%) within this period. Even if the population shares of young or prime age citizens of Poland are relatively high as compared to other EU countries, the age distribution of workers was no more concentrated between 18 to 35 years after 2004 than a few years earlier. Moreover, the labour market situation of young people improved, not deteriorated, after 2003 when their employment rate started to rebound.

The more appealing story-line bases on the interplay of demographic and education factors. Between 1994 and 2009 there was a systematic increase in the population share of persons with higher and secondary education. Hardly surprisingly, shifts in the education structure were driven by education choices of young Poles. While the share of workers over 17 and below 44 with higher education in 1994 was barely 7%, in 2004 it was around 12%, and in 2009 reached 20% (based on the sample earlier used). As the emigration propensity of persons with high education, especially just after they graduate from a university, remains above that of their peers with lower educational attainment, the protracted investments of young Poles in human capital in post-transition years had their fair contribution to reinforcement of emigration trends after 2004.

To illustrate the importance of education patterns in Poland before the EU enlargement, two indices are plotted in Figure 6. The first index assesses evolution of the emigration propensity of Polish workers between 1994 and 2009 which would have been observed, had the education structure remained constant (same as distribution of other factors affecting the emigration hazard in the population) and only the age structure developed factually. The index is calculated as the average of the predicted emigration probabilities for persons with different age. The relevant predicted probabilities are established on the basis of the fourth regression from Table 3 for a worker whose traits, aside of age (and status in a household), can be described by the sample averages of explanatory variables. In line with earlier comments, the index systematically falls.

The second index is constructed similarly to the first one but uses diverse predicted emigration probabilities for workers in separate age-education groups. This index explicates variation in

the average emigration propensity tied to shifts in age and education structure and develops along a very different path. Namely, it systematically increases from 1994 on and levels-off only around 2003.

As it appears, emigration trends observed after 2004 could be exacerbated by a depressed labour market situation but much before the date of the EU accession. Scarce employment opportunities forced competition for existing jobs and at the same time lowered the alternative costs of remaining in education for younger persons. In the effect, a higher share of young workers decided to prolong their education. These developments were fuelled by an education policy targeted at limiting a role of vocational education and independently supporting, via liberal entry rules, founding of private higher schools. Thus, a significant share of professional education was shifted to postsecondary schools and universities. These in turn offer very diverse quality of education but undoubtedly contributed to increased accumulation of general skills and to better knowledge of foreign languages by young workers.

Secondly, the slack labour market asked for greater flexibility of employment regulation. From 1999 to 2004, the share of temporary employment contracts was systematically going up at the cost of permanent contracts (Figure 7). Later, the relative shares of temporary and permanent employees stabilized in line with a general improvement on the labour market situation and with restricting the ability of employers to renew temporary contracts with the same employee several times in a row. The structure of employment in 2004 was much different as compared to the middle of the 90ties, with a considerably higher share of temporary employed. Importantly, the emigration propensity of the latter proves to be significantly higher than that of permanent workers.

A legitimate conclusion is that the progressing aging of the Polish population and the expected reduction in numbers of labour market entrants in coming years, will be reflected in lower cross-border mobility of Poles only with a certain lag. The emigration propensity of Polish workers is likely to remain high, mainly due to changes in education preferences counterbalancing negative demographic developments [18].

5.2   Relevance of Timing of an Open-Door Policy

Convergence of nominal wages closed the gap between the Polish and foreign average earnings by around 80% only within the period from 1994 to around 2007. Considered in isolation from other factors, it should result in a reduction of the emigration probability of Polish workers by around 0.6%. Before the global crisis, variation in the average foreign unemployment rate was generally modest. However, at the beginning of the sample period the unemployment rate in countries that eventually opened up their borders was up to 3.5 ppt. higher than in closed-

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[18]Stark and Fan (2006, 2007) suggest that a positive feedback loop between education level and the emigration rate can set in. Following their logic, if educated individuals have better chances to be successful on foreign labour markets, incentives to acquire higher level of education become stronger when borders are open. This in turn would result in a more intense human capital accumulation by workers in a source country. This self-facilitating mechanism should prevent deterioration of the average education level of stayers even when emigrants are positively selected. On the other hand, it may also (similarly as network effects) introduce a positive state-dependence in the emigration rate from Poland in the aftermath of the EU enlargement.

borders countries and at a very similar level just before the EU enlargement. The reduction in the relative unemployment rate in open-door countries until 2007, while separated from other factors at work, could contribute to an increase in the probability of choosing these destinations by 12% to 18%.

A lion's share of the increase in the emigration propensity after 2003 can be attributed to changes in immigration policy in recipient countries. Liberalization of immigration regimes in most of the EEA member states before 2009 led to an increase in the emigration propensity of the average Polish worker who would considered leaving Poland in ,,typical" 1993–2009 conditions on foreign labour markets, by 0.5% [19]. Due to coincidence of changes in the EEA countries immigration regimes with other processes bringing costs of migration from the NMS down, the emigration regressions are likely to provide an upper bound estimate for an actual impact of the introduction of open-door policies. Still, the results suggest that the opening of borders had a similar (but reverse) effect on emigration from Poland as the decade of convergence of wages.

Most importantly, these outcomes say little about interactions between the changes in immigration policies and a situation on host labour markets at the moment of their introduction. To delineate a role of timing of introduction of the open-door policy, two counterfactual scenarios are run on the basis of the estimated regressions. The first scenario is constructed under an assumption that immigration policies of the ,,old" EEA countries toward the NMS citizens remained intact after 2004. In the second scenario, an introduction of the open-door policy in all the EEA is assumed to have taken place already in 2004. To ease the comparison of the scenarios, effects of an accumulation of emigration specific capital on changes of emigration propensity are neutralized by setting number of emigrants in all households to zero. The predicted emigration probabilities of the representative worker for each year under the two sets of assumptions are plotted in Figure 8 jointly with the predicted probabilities corresponding with the factual changes in immigration policies.

Figure 8 suggests that the realized increase in the emigration probability resulting from the factual gradual opening of borders in the EEA was the highest in 2007 and amounted to 16 ‰– far below the figure of 0.5% calculated earlier ignoring evolution of the labour market situation abroad[20]. Interestingly, even if there was no liberalization of an immigration policy in any of the EEA countries, emigration from Poland would still expand between in 2003 and 2004, but subside thereafter. The predicted probabilities corresponding with the full-liberalization scenario reveal that introduction of the open-door regime in all the EEA in 2004 would almost triple the factual increase in the emigration rate (to 47‰). In contrast, the same regime introduced (or already in place) in 2008 or 2009, when the situation on foreign labour markets was much gloomier, would inflate the emigration rate, as compared to the immigration policy status-quo scenario, by mere 31‰in 2008 or 21‰a year later. The implied difference between the numbers of emigrants that would leave Poland in response to opening of borders by all the EEA countries in 2004 versus in

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[19]Applying similar measure, 38% to 43% more workers would leave for labour markets which were open for the NMS citizens before the end of 2009, than in a counterfactual scenario with a common immigration policy in all destination countries.

[20]Taking into account a related development of emigration networks, the emigration rate in 2007 would increase by 22‰.

2009 is close to 600 thousands (in the former case around 1.2 more Polish workers would move abroad and in the latter around 600 thousands).

Provided that European economies are in a worse shape than before the crisis, opening of borders by the last EEA countries in 2011, should have milder positive effect on emigration from Poland than an introduction of the same policy by the U.K. or Ireland in 2004. A sharp increase in the average unemployment rate abroad in 2008–2009 itself, translated into 15‰ fall in the emigration probability of Polish workers. Still, as labour markets in German speaking countries were relatively sheltered from the consequences of the global crisis, after liberalization of the labour market entry for the NMS citizens by Germany, Austria or Switzerland, immigration to these countries can mount at the cost of lower emigration to alternative directions.

In the medium run, broader emigration opportunities for Polish workers, should strengthen responses of Polish workers to positive signals from foreign labour markets. In particular, emigration flows from Poland are likely intensify again after (and if) the effects of the 2007 recession on foreign markets fade away.

5

6 Conclusions

The paper evaluates a role of financial and non-pecuniary factors in fuelling temporary emigration of Polish workers between 1994 and 2009. The exploited data from the quarterly Polish household survey cover mostly temporary emigrants, namely those who did not register their departure with a responsible administration unit. The survey data enable to track down the labour market situation of individuals before their leave abroad. In line with earlier evidence on workers' mobility, those who emigrate from Poland are on average younger and better educated than non-migrants. Life-cycle patterns of emigration differ greatly for persons with higher and other education levels. While workers in the former group are most likely to emigrate just after graduation and their emigration propensity gradually falls thereafter, for workers in the latter group the emigration hazard peaks only around the age of 30-35 to eventually lower later. Workers who have kids are more reluctant to emigrate. The plausible interpretation is that for them a movement abroad involves higher costs, as they are faced with a choice to either emigrate jointly with other family members or deal with a separation. Persons receiving permanent benefits (retirement or disability) and workers who can count on financial support of other members of their households, are also less mobile. Evidence on the analogous effects of unemployment benefits on the emigration propensity of their beneficiaries are mixed. In a great share of specifications receiving unemployment benefit has no explanatory power in a great share of specifications. An access to immigrants networks, measured either by presence of an emigrant worker in a household or the emigration rate in the region of origin, has a positive and strong influence on propensity to emigrate.

Non-employed emigrate more frequently than employed, in particular when they have no job experience. For otherwise similar workers the predicted probability of emigration doubles when a person is either unemployed or a non-participant. Still, the lower emigration propensity of employed can be attributed mostly to the low mobility of persons working on permanent contracts, owning a farm or holding a job with a high social status. Willingness to emigrate of temporary employees or helping family members is not significantly different from that of non-employed.

The latter findings, especially on a role of workers' attachment to the home labour market, offer a new insight into dynamics of the post-accession emigration from Poland. It was not only a high share of young workers in the population that reinforced labour outflows. Higher education of young Poles, as compared to their parents, and actual deregulation of the labour market also contributed to a sharp increase in the emigration rate after 2004. To the degree to which prolonging education and changes in labour market regulations were a reaction to high unemployment rates in the post-transition years, the high mobility of Polish workers can be explain by negative labour market developments in 90s and the beginning of the following decade and less so by more favourable trends after 2003.

The opening of borders for the NMS citizens by most of the ,,old" EEA countries was one of the most important factors explaining intensity of emigration from Poland after the transition. Changes in immigration policy in European countries practically outweighed the effects of the fast nominal wage convergence that started in 90s. According to the estimates, the loosening of

immigration restrictions in 10% of all EEA labour markets was reflected in around 0.2‰ increase in emigration propensity of the sample (between 1993 to 2009) average Polish worker. The introduction of the open-door policy by the EEA member states resulted as well in a redirection of emigration flows from non-European to European destinations, and in particular to countries with more liberal immigration regimes.

Even more importantly, the free movement of labour between the EEA countries strengthens the response of Polish workers to developments on foreign labour markets. The results suggest that a 1% increase in foreign wages translated into an increase of approximately 0.2‰ in the emigration probability of the average Polish worker when immigration restrictions in Europe were as in 2004. The resulting change in the emigration propensity, under the same conditions but when all the EEA countries would opened their borders to emigration from Poland, swells to 4‰. A change in the emigration propensity following after a 1 ppt. drop in the foreign unemployment rate, under the two assumptions, goes up from 4‰ up to 69‰.

The European labour market integration seems to contribute – via labour adjustment margin – to a strengthening of equilibrating mechanisms in host economies. The same variation in wages or employment chances in European regions may introduce a much stronger variation in immigration from the new member states. At the same time, free labour mobility increases the importance of foreign labour market developments for conduct of economic policies in Poland, including policies designed to smooth the business cycle fluctuations.

Limitations of the data used call for cautious interpretation of some quantitative results. Concerns about non-randomness of missing observations on emigration events, the relative rareness of emigration events as compared to non-events (staying) in the sample can hinder preciseness of the reported predicted or marginal probabilities. Second, measures of changes in immigration policy (the share of open-door countries in total population or GDP of the EEA) does not separate the effects of an open-door policy from influences of concurrent developments e.g. the reduction of transport cost related to the entry of low-cost carriers into Eastern European markets. What follows, any counterfactual predictions based on the estimated regressions are most probably subject to a measurement error. Thus, the study focuses on detecting and describing emigration patterns in relation to labour market situation or immigration policies rather than quantifying the effects of the latter. Finally, basing only on Polish experiences, it does not directly address the question of heterogeneous responses of workers from the NMS after liberalization of immigration policies in wealthier EEA member states.

6

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Table 1: Destination countries

Country	Date of introduction of open-door policy	Mean relative income in EUR (1994–2009)	Mean relative income in PPS (1994–2009)	Mean unem-ployment rate (1994–2009)	Weight	Number of flows to a country in the sample
EEA member states classified as open-door countries (as at the beginning of 2009)						
Ireland	May 2004	5.55	2.65	7.17	0.01	55
Sweden	May 2004	4.84	2.16	7.19	0.01	15
United Kingdom	May 2004	5.06	2.51	6.16	0.08	238
Finland	May 2005	4.47	2.04	10.29	0.00	1
Greece	May 2005	3.18	2.07	9.78	0.01	11
Portugal	May 2005	2.60	1.71	6.50	0.00	1
Spain	May 2005	4.15	2.53	13.08	0.03	25
Iceland	May 2006	5.79	2.49	3.54	0.00	1
Italy	August 2006	4.41	2.40	9.14	0.08	110
Netherlands	May 2007	5.18	2.59	4.09	0.03	58
Luxembourg	November 2007	6.55	3.12	3.55	0.00	0
France	July 2008	5.37	2.58	9.71	0.04	31
Norway	January 2009	6.69	2.70	3.84	0.01	23
Denmark	May 2009	4.39	1.73	5.04	0.00	5
Belgium	May 2009	4.70	2.36	8.32	0.03	28
New Member States						
Czech Republic	May 2004	1.31	1.31	6.48	0.00	2
Cyprus	May 2004	3.39	2.08	3.96	0.00	1
Estonia	May 2004	1.14	1.05	9.39	0.00	0
Hungary	May 2004	1.31	1.28	7.79	0.00	2
Malta	May 2004	2.41	1.94	6.62	0.00	0
Latvia	May 2004	0.76	0.77	12.84	0.00	0
Lithuania	May 2004	0.80	0.87	10.06	0.00	1
Slovakia	May 2004	1.03	1.07	14.66	0.00	1
Slovenia	May 2005	2.23	1.62	6.44	0.00	0
EEA member states classified as closed-borders countries (as at the beginning of 2009)						
Austria		5.27	2.64	4.32	0.02	25
Germany		4.56	2.22	8.63	0.34	377
Switzerland		7.51	2.95	3.48	0.01	17
Other emigration destinations						
Australia		4.26	2.36	6.58	0.00	4
Canada		4.13	2.37	7.78	0.02	9
Israel		2.29	1.38	8.39	0.00	4
Japan		6.23	2.52	4.31	0.00	0
South Korea		3.20	2.41	3.68	0.00	1
New Zealand		3.89	2.29	5.48	0.00	0
United States		6.36	3.37	5.38	0.26	86
Aggregates						
Open-door countries		5.00	2.47	8.32	0.33	610
Closed-borders countries		5.58	2.64	7.21	0.66	513
Closed-borders European countries		5.04	2.29	8.27	0.37	409
All		**5.38**	**2.57**	**7.41**	**1**	**1132**

Table 2: Data Description

Variable	Total sample				Stayers				Temporary emigrants			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Emigration	0.002	0.043	0	1								
Emigration to open-door country			0	1					0.538	0.499	0	1
Female	0.489	0.500	0	1	0.489	0.500	0	1	0.386	0.487	0	1
Age	38.692	12.762	18	64	38.707	12.762	18	64	30.663	9.867	18	64
Higher education	0.107	0.309	0	1	0.107	0.309	0	1	0.110	0.312	0	1
Postsecondary education	0.254	0.435	0	1	0.254	0.435	0	1	0.291	0.454	0	1
Secondary education	0.092	0.289	0	1	0.092	0.289	0	1	0.140	0.348	0	1
Vocational education	0.327	0.469	0	1	0.327	0.469	0	1	0.343	0.475	0	1
Primary education	0.221	0.415	0	1	0.221	0.415	0	1	0.117	0.321	0	1
Never worked	0.267	0.442	0	1	0.267	0.442	0	1	0.371	0.483	0	1
Student	0.086	0.280	0	1	0.086	0.280	0	1	0.074	0.262	0	1
Married	0.663	0.473	0	1	0.663	0.473	0	1	0.445	0.497	0	1
Number of children under 5	0.141	0.404	0	5	0.141	0.404	0	5	0.123	0.371	0	3
Number of children over 4	0.430	0.794	0	9	0.430	0.795	0	9	0.320	0.714	0	4
Employed	0.597	0.490	0	1	0.598	0.490	0	1	0.396	0.489	0	1
Unemployed	0.104	0.305	0	1	0.103	0.304	0	1	0.304	0.460	0	1
Non-participant	0.299	0.458	0	1	0.299	0.458	0	1	0.300	0.459	0	1
Self employed	0.065	0.247	0	1	0.066	0.247	0	1	0.039	0.193	0	1
Helping family member	0.029	0.167	0	1	0.029	0.167	0	1	0.044	0.206	0	1
Farmer	0.068	0.252	0	1	0.068	0.252	0	1	0.049	0.217	0	1
Permanent employee	0.370	0.483	0	1	0.370	0.483	0	1	0.147	0.354	0	1
Temporary employee	0.065	0.247	0	1	0.065	0.247	0	1	0.117	0.321	0	1
Management and administration	0.037	0.188	0	1	0.037	0.188	0	1	0.009	0.094	0	1
Specialists	0.134	0.341	0	1	0.134	0.341	0	1	0.040	0.195	0	1
Services and office workers	0.106	0.308	0	1	0.106	0.308	0	1	0.064	0.246	0	1
Qualified workers	0.271	0.445	0	1	0.271	0.445	0	1	0.253	0.435	0	1
Simple jobs	0.049	0.215	0	1	0.049	0.215	0	1	0.030	0.171	0	1
Short-term unemployed	0.057	0.232	0	1	0.057	0.231	0	1	0.194	0.396	0	1
Long-term unemployed	0.046	0.211	0	1	0.046	0.210	0	1	0.110	0.312	0	1
Retirement benefit	0.053	0.225	0	1	0.054	0.225	0	1	0.004	0.066	0	1

	Mean	Std	Min	Max	Mean	Std	Min	Max	Mean	Std	Min	Max
Disability benefit	0.091	0.288	0	1	0.091	0.288	0	1	0.009	0.094	0	1
Unemployment benefit	0.024	0.152	0	1	0.024	0.152	0	1	0.054	0.226	0	1
Share of members with permanent income	0.695	0.282	0	1	0.696	0.282	0	1	0.553	0.286	0	1
Number of emigrants in a household	0.025	0.184	0	6	0.025	0.183	0	6	0.184	0.479	0	3
Emigration rate in the region (in 2002)	0.022	0.018	0.007	0.099	0.022	0.018	0.007	0.099	0.026	0.021	0.007	0.099
Unemployment rate in the region	0.142	0.051	0.038	0.287	0.142	0.051	0.038	0.287	0.148	0.046	0.038	0.273
City	0.252	0.434	0	1	0.253	0.434	0	1	0.166	0.372	0	1
Town	0.269	0.444	0	1	0.269	0.444	0	1	0.258	0.438	0	1
Rural area	0.478	0.500	0	1	0.478	0.500	0	1	0.576	0.494	0	1
Number of observations	**611,970**				**610,838**				**1,132**			

Table 3: The Emigration Propensity Regressions

Independent variables	Emigration dummy			
	coef. (std. err.)	coef. (std. err.)	coef. (std. err.)	coef. (std. err.)
Female	-0.1890***	-0.1899***	-0.1904***	-0.1689***
	(0.0242)	(0.0241)	(0.0244)	(0.0250)
Age	0.0408**	0.0406**	0.0438**	0.0402**
	(0.0191)	(0.0190)	(0.0190)	(0.0190)
Age^2	-0.0007***	-0.0007***	-0.0007***	-0.0007***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Higher education	2.9978***	2.9834***	2.6262***	2.1968***
	(0.5222)	(0.5181)	(0.5244)	(0.5394)
Postsecondary education	0.5331	0.5443	0.3791	0.2917
	(0.3847)	(0.3824)	(0.3835)	(0.3852)
Secondary education	0.5835	0.5612	0.4466	0.3800
	(0.4328)	(0.4301)	(0.4310)	(0.4326)
Vocational education	-0.1063	-0.1392	-0.2128	-0.2120
	(0.3554)	(0.3536)	(0.3519)	(0.3526)
Higher education * Age	-0.1440***	-0.1425***	-0.1214***	-0.0932***
	(0.0308)	(0.0305)	(0.0311)	(0.0317)
Higher education * Age^2	0.0017***	0.0017***	0.0014***	0.0011***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)
Never worked	0.1734***	0.1706***	0.1430***	0.1507***
	(0.0367)	(0.0365)	(0.0365)	(0.0364)
Student	-0.4059***	-0.4054***	-0.4046***	-0.4036***
	(0.0539)	(0.0536)	(0.0531)	(0.0531)
Married	0.0570	0.0563	0.0705*	0.0679*
	(0.0368)	(0.0364)	(0.0368)	(0.0369)
Number of children under 5	-0.1616***	-0.1668***	-0.1702***	-0.1763***
	(0.0344)	(0.0340)	(0.0341)	(0.0343)
Number of children over 4	-0.0366**	-0.0369**	-0.0429**	-0.0454**
	(0.0185)	(0.0183)	(0.0183)	(0.0183)
Employed	-0.2098***	-0.2134***		
	(0.0432)	(0.0430)		
Self employed			-0.2118***	-0.1358
			(0.0670)	(0.0884)
Helping family member			-0.0006	-0.0509
			(0.0632)	(0.0866)
Farmer			-0.1676***	-0.2188**
			(0.0631)	(0.0873)
Permanent employee			-0.3935***	-0.3419***
			(0.0489)	(0.0717)
Temporary employee			-0.0850*	-0.0516
			(0.0480)	(0.0704)
Management and administration				-0.3238***
				(0.1149)
Specialists				-0.2722***
				(0.0785)
Services and office workers				-0.1009
				(0.0710)
Qualified workers				0.0759
				(0.0633)
Unemployed	-0.0102	-0.0142		
	(0.0337)	(0.0337)		
Short-term unemployed			0.0303	0.0309

Independent variables	Emigration dummy			
	coef. (std. err.)	coef. (std. err.)	coef. (std. err.)	coef. (std. err.)
			(0.0380)	(0.0381)
Long-term unemployed			-0.0807*	-0.0743*
			(0.0422)	(0.0422)
Retirement benefit	-0.4277***	-0.4257***	-0.4500***	-0.4830***
	(0.1315)	(0.1308)	(0.1318)	(0.1363)
Disability benefit	-0.6243***	-0.6258***	-0.6490***	-0.6500***
	(0.0948)	(0.0940)	(0.0935)	(0.0931)
Unemployment benefit	-0.0438	-0.0625	-0.1091**	-0.1023**
	(0.0508)	(0.0503)	(0.0517)	(0.0517)
Share of members with permanent income	-0.2397***	-0.2551***	-0.2647***	-0.2546***
	(0.0495)	(0.0492)	(0.0499)	(0.0501)
Number of emigrants in a household	0.3966***	0.3944***	0.3905***	0.3904***
	(0.0237)	(0.0236)	(0.0236)	(0.0236)
Emigration rate in the region (in 2002)	5.7539***	4.9829***	5.1308***	5.1177***
	(0.8915)	(0.8826)	(0.8848)	(0.8869)
Unemployment rate in the region	-0.3327	2.6073***	2.4543***	2.4807***
	(0.7036)	(0.3340)	(0.3357)	(0.3362)
City	-0.0877***	-0.0909***	-0.0736**	-0.0625**
	(0.0302)	(0.0301)	(0.0311)	(0.0314)
Town	-0.0551**	-0.0550**	-0.0372	-0.0300
	(0.0265)	(0.0263)	(0.0271)	(0.0273)
Unemployment rate abroad		-20.3803***	-20.4245***	-20.4249***
		(2.3192)	(2.3380)	(2.3476)
Relative nominal income abroad		1.2199***	1.2393***	1.2388***
		(0.1127)	(0.1134)	(0.1135)
Open-door policy		1.0228***	0.9744***	0.9704***
		(0.0821)	(0.0826)	(0.0828)
Year dummies	Yes	No	No	No
Constant	-3.3933***	-4.5247***	-4.5887***	-4.5582***
	(0.3401)	(0.3658)	(0.3662)	(0.3665)
Number of observations	611,970	611,970	611,970	611,970
Number of clusters	254,866	254,866	254,866	254,866
LR Chi2	2,438.30	2,310.00	2,399.17	2,449.52
AIC	14,206.27	14,312.58	14,233.40	14,191.05
BIC	14,976.33	14,958.07	14,935.52	14,938.46
McFadden's Adj R2:	0.139	0.133	0.138	0.140

Note: *** = statistically significant at the 1% confidence level, ** = statistically significant at the 5% confidence level and * = statistically significant at 1% confidence level. Key abbreviations: LR = likelihood ratio; AIC = Akaike'e information criterion; BIC = Bayesian information criterion. Next to variables listed in the table all regressions are controlled for: interactions between postsecondary, secondary, vocational education dummies and age, age squared (all not statistically significant), regional, quarterly, single household and relation to a household head dummies.

Table 4: The Destination Choice Regressions with Selection

Independent variables	Destination dummy			
	coef. (std. err.)	coef. (std. err.)	coef. (std. err.)	coef. (std. err.)
Female		0.2386***		0.2324**
		(0.0926)		(0.0926)
Higher education		-1.2832		-1.2535
		(2.7007)		(2.6815)
Postsecondary education		3.2363**		3.2768**
		(1.5516)		(1.5448)
Secondary education		-1.1387		-1.0791
		(1.8513)		(1.8408)
Vocational education		4.4376***		4.4709***
		(1.5067)		(1.5026)
Postsecondary education * Age		-0.1965**		-0.1984**
		(0.0958)		(0.0954)
Vocational education * Age		-0.2950***		-0.2968***
		(0.0944)		(0.0941)
Postsecondary education * Age^2		0.0028**		0.0029**
		(0.0014)		(0.0013)
Vocational education * Age^2		0.0043***		0.0044***
		(0.0014)		(0.0013)
Never worked		-0.1726*		-0.1601
		(0.1025)		(0.0988)
Difference in unemployment rates between regions	1.3629	0.6579	1.3422	0.6519
	(1.5335)	(1.5994)	(1.5343)	(1.5957)
Relative nominal income in open-door countries	-6.6811	-10.7073**	-6.7535	-10.8077**
	(4.3436)	(4.4700)	(4.3401)	(4.4511)
Open-door policy	1.3175***	1.5805***	1.3252***	1.5909***
	(0.3467)	(0.3610)	(0.3466)	(0.3593)
Constant	0.1470	-1.4619	0.1108	-1.6089
	(0.4066)	(1.3451)	(0.4014)	(1.3293)
Mills ratio	-0.0960	0.0372	-0.0850	0.0805
	(0.1175)	(0.1655)	(0.1166)	(0.1572)
Number of uncensored observations	1,132	1,132	1,132	1,132
LR Chi2	116.88	217.93	117.19	224.65
AIC	15,720.13	15,663.29	15,598.78	15,541.49
BIC	16,422.25	16,557.92	16,402.82	16,538.04
Chi2(1) for independence of equations	0.87	0.07	0.7	0.34
Prob (Chi2=0)	0.3504	0.7967	0.4038	0.5590

Note: *** = statistically significant at the 1% confidence level, ** = statistically significant at the 5% confidence level and * = statistically significant at 1% confidence level. Key abbreviations: LR = likelihood ratio; AIC = Akaike'e information criterion; BIC = Bayesian information criterion. Next to variables listed in the table the second and fourth regressions (from the left) are controlled for: age, age squared, interactions between higher, secondary education dummies and age, age squared, a student dummy (all not statistically significant).

Table 5: Alternative Specifications of the Emigration Propensity Regression

Independent variables	Emigration dummy		Open-door destination	Closed-borders destination
	coef. (std. err.)	coef. (std. err.)	coef. (std. err.)	coef. (std. err.)
Female	-0.1953***	-0.1957***	-0.1685***	-0.3400***
	(0.0257)	(0.0286)	(0.0429)	(0.0487)
Age	0.0602***	0.0459**	0.1361***	0.0291
	(0.0206)	(0.0183)	(0.0367)	(0.0307)
Age^2	-0.0010***	-0.0008***	-0.0022***	-0.0005
	(0.0003)	(0.0003)	(0.0005)	(0.0004)
Higher education	2.8304***	2.3689***	4.6321***	2.6519**
	(0.5712)	(0.6391)	(0.9318)	(1.0933)
Postsecondary education	0.4591	0.7065*	1.7243**	-0.2859
	(0.4030)	(0.4125)	(0.6932)	(0.6983)
Secondary education	0.5823	0.4347	0.5713	1.3843*
	(0.4577)	(0.4894)	(0.7903)	(0.7978)
Vocational education	-0.0444	0.0205	1.3685**	-1.0435*
	(0.3726)	(0.3777)	(0.6677)	(0.6170)
Higher education * Age	-0.1389***	-0.1139***	-0.2415***	-0.1186**
	(0.0331)	(0.0360)	(0.0553)	(0.0591)
Postsecondary education * Age	-0.0132	-0.0229	-0.0884**	0.0379
	(0.0254)	(0.0252)	(0.0442)	(0.0420)
Vocational education * Age	0.0102	0.0130	-0.0832**	0.0837**
	(0.0233)	(0.0228)	(0.0423)	(0.0368)
Higher education * Age^2	0.0017***	0.0014***	0.0032***	0.0014*
	(0.0004)	(0.0005)	(0.0008)	(0.0007)
Postsecondary education * Age^2	0.0002	0.0002	0.0013*	-0.0005
	(0.0004)	(0.0004)	(0.0007)	(0.0006)
Vocational education * Age^2	-0.0001	-0.0002	0.0013**	-0.0012**
	(0.0003)	(0.0003)	(0.0006)	(0.0005)
Never worked	0.1186***	0.1803***	0.1050	0.3288***
	(0.0372)	(0.0425)	(0.0655)	(0.0730)
Student	-0.4430***	-0.3627***	-0.4808***	-0.6005***
	(0.0562)	(0.0650)	(0.0933)	(0.1062)
Married	0.0770**	0.1170***	0.1141	0.0839
	(0.0385)	(0.0410)	(0.0698)	(0.0667)
Number of children under 5	-0.1667***	-0.2126***	-0.2183***	-0.2465***
	(0.0355)	(0.0393)	(0.0673)	(0.0620)
Number of children over 4	-0.0462**	-0.0773***	-0.1029***	-0.0274
	(0.0191)	(0.0215)	(0.0396)	(0.0307)
Self employed	-0.2232***	-0.1758**	-0.1804	-0.3394**
	(0.0689)	(0.0795)	(0.1165)	(0.1351)
Helping family member	-0.0181	0.0060	0.0130	0.0153
	(0.0670)	(0.0770)	(0.1160)	(0.1227)
Farmer	-0.1986***	-0.1022	-0.1951	-0.2217*
	(0.0665)	(0.0745)	(0.1196)	(0.1185)
Permanent employee	-0.4015***	-0.3631***	-0.4939***	-0.5090***
	(0.0505)	(0.0581)	(0.0888)	(0.0974)
Temporary employee	-0.1055**	-0.0246	-0.1374*	-0.0783
	(0.0489)	(0.0562)	(0.0823)	(0.0998)
Short-term unemployed	0.0478	0.0167	0.1596**	-0.0705
	(0.0394)	(0.0420)	(0.0710)	(0.0702)
Long-term unemployed	-0.0600	-0.0280	0.0521	-0.2958***
	(0.0435)	(0.0512)	(0.0778)	(0.0795)
Retirement benefit	-0.4860***	-0.4861***	-0.5339*	-0.7333***

	(0.1657)	(0.1660)	(0.2764)	(0.2277)
Disability benefit	-0.6457***	-0.7291***	-0.9055***	-0.9253***
	(0.1042)	(0.1278)	(0.2285)	(0.1562)
Unemployment benefit	-0.0785	-0.0753	-0.1429	-0.1069
	(0.0524)	(0.0529)	(0.1043)	(0.0897)
Share of members with permanent income	-0.2667***	-0.2818***	-0.3470***	-0.3299***
	(0.0517)	(0.0581)	(0.0893)	(0.0957)
Number of emigrants in a household	0.3674***	0.3613***	0.4974***	0.5529***
	(0.0240)	(0.0294)	(0.0377)	(0.0434)
Emigration rate in the region (in 2002)	5.8456***	3.9378***	6.4121***	9.2824***
	(0.9326)	(0.9645)	(1.6558)	(1.6110)
Unemployment rate in the region	2.6445***	1.5176***	-2.2590**	0.0968
	(0.3532)	(0.4202)	(1.1159)	(1.1911)
City	-0.0682**	-0.0849**	0.0044	-0.2109***
	(0.0324)	(0.0372)	(0.0571)	(0.0598)
Town	-0.0391	-0.0131	0.0314	-0.1391***
	(0.0280)	(0.0314)	(0.0499)	(0.0510)
Unemployment rate abroad	-20.3604***	-12.5516***	-28.5353***	-25.6155***
	(2.3969)	(2.7476)	(4.4735)	(4.9072)
Relative nominal income abroad	1.2148***	0.7964***	2.6489***	2.3071***
	(0.1185)	(0.1317)	(0.2766)	(0.2828)
Difference in unemployment rates between destinations			-29.6564***	-14.4697***
			(4.8543)	(5.5379)
Difference in nominal income between destinations			-0.5479	-0.9340
			(0.9283)	(0.9970)
Open-door policy	1.0913***	0.8077***	1.1893***	0.4782**
	(0.0879)	(0.1015)	(0.2134)	(0.1994)
Constant	-4.9052***	-4.4425***	-8.3765***	-7.1261***
	(0.3788)	(0.3793)	(0.7112)	(0.6864)
Number of observations	611,866	607,401		611,970
Number of clusters	254,856	256,516		254,866
LR Chi2	1,779.81	1,289.35		2,272.04
AIC	13,040.16	10,411.48		15,555.45
BIC	13,742.26	11,113.13		17,004.98
McFadden's Adj R2:	0.142	0.125		

Note: *** = statistically significant at the 1% confidence level, ** = statistically significant at the 5% confidence level and * = statistically significant at 1% confidence level. Key abbreviations: LR = likelihood ratio; AIC = Akaike'e information criterion; BIC = Bayesian information criterion. Next to variables listed in the table all regressions are controlled for: interactions between secondary, vocational education dummies and age, age squared (all not statistically significant), regional, quarterly, single household and relation to a household head dummies.

Table 6: Alternative Specifications of the Destination Choice Regression with Selection

Independent variables	Destination dummy			
	coef. (std. err.)	coef. (std. err.)	coef. (std. err.)	coef. (std. err.)
Female		0.2689***		0.3007***
		(0.1005)		(0.1081)
Age		0.0901		0.2360**
		(0.0849)		(0.1045)
Age^2		-0.0017		-0.0039***
		(0.0012)		(0.0015)
Higher education		-0.0611		0.0629
		(3.1094)		(3.2213)
Postsecondary education		3.6691**		3.9656**
		(1.7306)		(2.0154)
Secondary education		-1.0354		-0.0526
		(1.9736)		(2.3657)
Vocational education		4.7644***		6.7436***
		(1.6135)		(1.9468)
Postsecondary education * Age		-0.2139**		-0.2715**
		(0.1075)		(0.1260)
Vocational education * Age		-0.3116***		-0.4534***
		(0.1014)		(0.1220)
Postsecondary education * Age^2		0.0031**		0.0042**
		(0.0015)		(0.0018)
Vocational education * Age^2		0.0046***		0.0067***
		(0.0015)		(0.0017)
Student		0.3865*		0.4347*
		(0.2229)		(0.2239)
Difference in unemployment rates between regions	0.7228	0.1624	1.8090	1.2043
	(1.6131)	(1.6790)	(1.8304)	(1.9590)
Relative nominal income in open-door countrie	-6.6140	-11.0769**	-2.6475	-6.5045
	(4.5841)	(4.7569)	(5.0960)	(5.4033)
Open-door policy	1.2651***	1.4808***	1.1430***	1.5101***
	(0.3672)	(0.3813)	(0.4184)	(0.4426)
Constant	-0.0254	-1.5672	0.5875	-2.8742
	(0.4643)	(1.4869)	(0.5041)	(1.8660)
Mills ratio	-0.0079	0.0842	-0.2289	-0.1579
	(0.1346)	(0.1869)	(0.1479)	(0.2356)
Number of uncensored observations	1,028	1,132	777	777
LR Chi2	79.3	197.12	58.28	108.87
AIC	14,329.53	14,252.69	11,392.93	11,358.82
BIC	15,088.25	15,203.92	12,151.16	12,309.44
Chi2(1) for independence of equations	0.01	0.28	3.11	0.65
Prob (Chi2=0)	0.9435	0.5936	0.0777	0.4213

Note: *** = statistically significant at the 1% confidence level, ** = statistically significant at the 5% confidence level and * = statistically significant at 1% confidence level. Key abbreviations: LR = likelihood ratio; AIC = Akaike'e information criterion; BIC = Bayesian information criterion. Next to variables listed in the table the second and fourth regressions (from the left) are controlled for: age, age squared, interactions between higher, secondary education dummies and age, age squared, a dummy for no working experience (all not statistically significant).

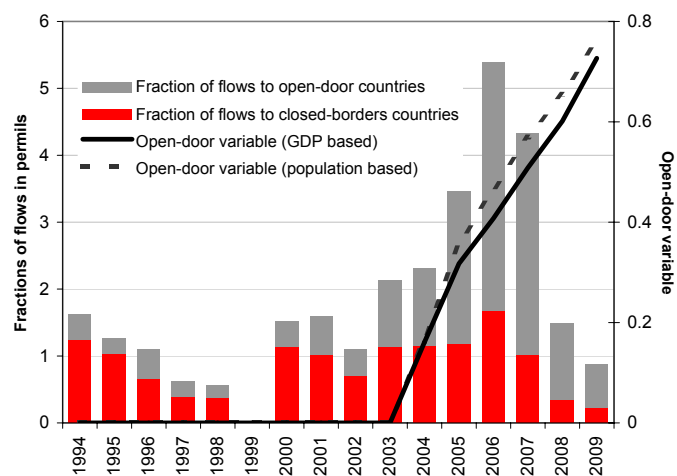Figure 1: Share of emigration flows in the sample and their directions 1994-2009

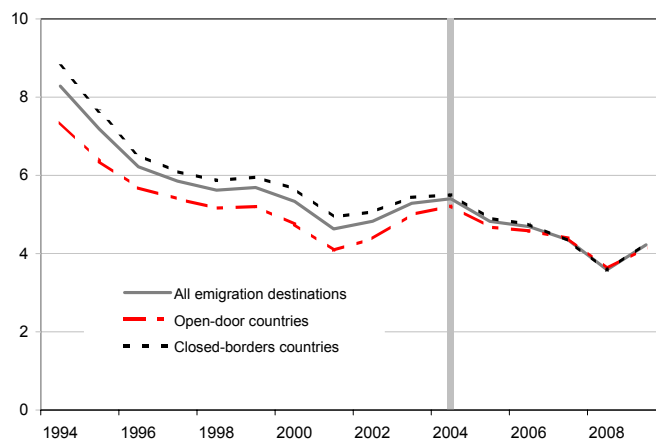Figure 2: The average relative income in recipient economies (in EUR)

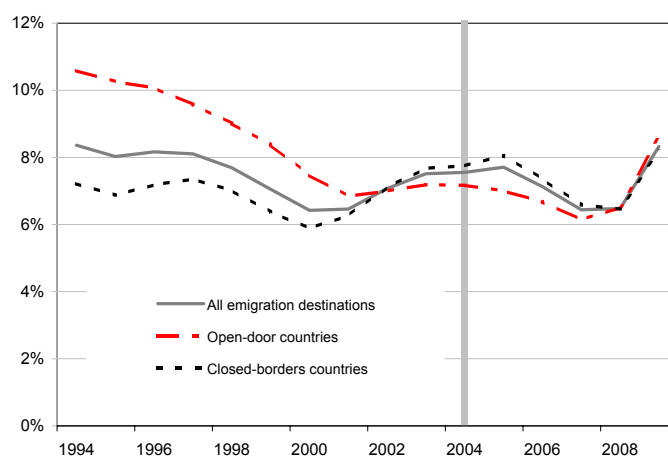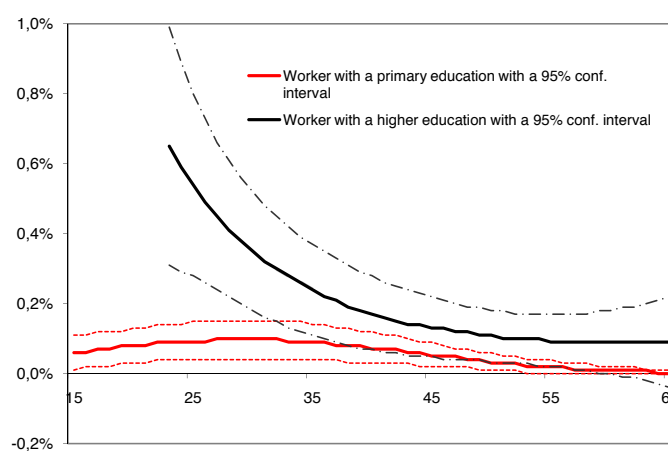Figure 3: The average unemployment rate in recipient economies

Figure 4: Age-dependence of the emigration probability

The predicted emigration probabilities (vertical axis) depending on age of respondents (horizontal axis) are formulated on the basis of the third specification in Table 3. A red solid line represents the predicted probabilities for a person (who is neither single nor a head of household or her spouse) with utmost primary education and red dotted lines the corresponding 95% confidence interval. A black solid line represents the analogous predictions for a person with higher education. Back dotted lines mark the 95% confidence interval for the predicted emigration probabilities of a worker with higher education.

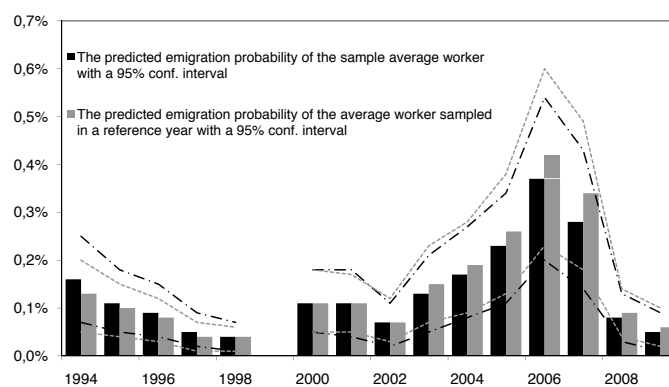Figure 5: The predicted emigration propensity evaluated at sample and yearly averages
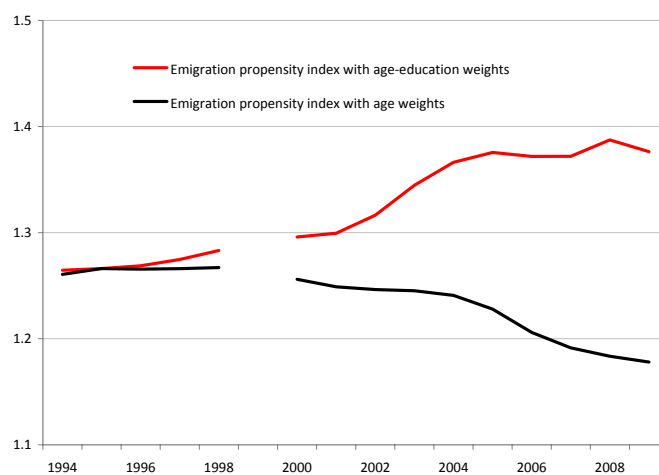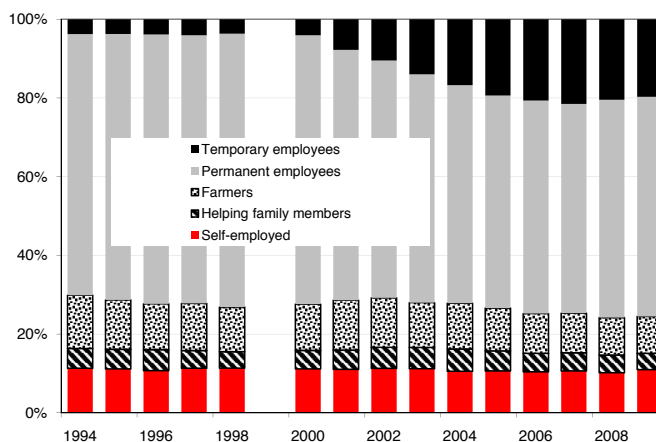

Figure 6: The emigration propensity index based on demographic and education structure of Polish population

Indices are constructed weighting the workers' population with weights corresponding with their age or education-age group as calculated on the basis of the forth emigration propensity regression from Table 3.

Figure 7: Employment structure in Poland

Distribution of types of employment on the basis of the LFS data. Observations are not weighted with the population weights.

Figure 8: Change in the emigration propensity of Polish workers under different open-door policy scenarios
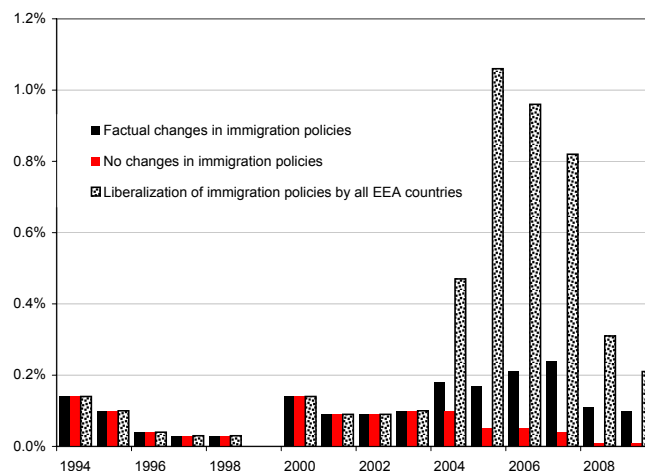
The predicted emigration probabilities are evaluated for the sample average individual (who is neither single nor a head of household or her spouse) on the basis of the fourth specification of the emigration propensity regression. In all scenarios a number of emigrants in all households is assumed to be zero.