

2.4 CHANGES IN THE EMIGRATION RATES OF MEDICAL DOCTORS BETWEEN 2003 AND 2011

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In most countries there are difficulties in the measurement of the flows of out-migration of medical doctors primarily because of the lack of reliable data, especially time-series data of emigration. Outflows are usually estimated by the number of applications for the recognition of medical diplomas in foreign countries. Nevertheless, these data have limited reliability regarding the international mobility trends of doctors because not everyone applying for such licenses or those who are planning to leave their home country will actually leave. Also, individuals may apply more than once, and this may cause overestimates of actual flows. Furthermore, not all countries systematically request these certificates, and many of those who work abroad do so on a part-time basis while also being employed in their countries of origin (*Wisnar, 2011*). Types of mobility and employment of immigrant doctors have become more diverse over recent decades, including short-term contracts, part-time work and weekend medical services and this makes the measurement of physicians' migration even more challenging (*Glinos, 2014*). Most of the earlier research on the emigration of Hungarian medical doctors used the number of applications for certificates of recognition of diplomas to estimate changes in the out numbers. (*Eke et al. 2009, Eke et al., 2011, Balázs, 2012*). Some other studies used survey data to analyze the intention of out-migration of doctors (*Girasek–Eke–Szócska, 2009*).

The research presented in this chapter employed a large-scale, merged, individual-level panel dataset to investigate how the probability of emigration of Hungarian medical doctors changed between 2003 and 2011. The sample is drawn from a large, longitudinal dataset covering 50 percent of Hungary's population aged 5–73 in 2003. The data collects information from registers of the Pension Directorate, the Tax Office, the Health Insurance Fund, the Office of Education, and the Public Employment Service. The dataset makes it possible to follow out-migration, attrition and other employment status changes of Hungarian medical doctors month by month at the individual level between 2003 and 2011. Each person in the sample is followed from January 2003 until December 2011 or until his/her exit from the social security system (for reasons of death or permanent emigration). Our data contains information on demographics (age, gender), educational attainment (for those with at least one unemployment spell), employment status, occupation code, wages for the occupation codes, and transfer receipt. We also have data on the region of residence of the individual and their sector of employment.

Out of the source sample a medical doctors' subsample was created. All individuals were included in the medical doctors' subsample whose occupation code was "medical doctor, general practitioner", "medical doctor, specialist doctor" or "medical doctor, dentist" according to the Hungarian Occupational Classification system for at least one month between January 2003 and December 2011. We have data for 18,654 individuals.¹

With the help of the detailed information on labour market status and other data concerning the individuals, five status groups could be distinguished: (1) those working as a physician or dentist in Hungary, (2) out-migrated, (3) exited the profession (attrition), (4) exited employment (related to inactivity, unemployment), or (5) died.

Those Hungarian citizens who register abroad have an obligation to notify the Hungarian authorities that they have left the country (deregister), but many emigrants omit this duty. First, we classified to the group of 'out-migrated' those who reported their move abroad in Hungary. We also wanted to identify those who had not deregistered. So, in addition, in the out-migrated group were placed all individuals who for at least four successive months were neither registered as employed in the database of the Pensions Directorate, nor were labelled in the database of the Health Insurance Fund as being in receipt of inpatient care sickness benefit, and who during that period had neither received any other kind of benefits (unemployment assistance, childcare pension, old age pension or other kind of pensions) nor had been registered as studying in full time education, or had died during this period.

In other words, the classification covered those individuals who 'disappeared' from the system. The other possible reason for the disappearance, which is becoming unregistered unemployed is practically non-existent among medical doctors in Hungary. So, it is very likely that using the presented method we were able to identify the non-deregistered emigrants with a good degree of accuracy.

Further restrictions were placed on the process of determining the non-deregistered emigrants. Only those medical doctors were signed as out-migrated who had worked as a physician or dentist in at least three successive months before the 'disappearance'. Also, we did not categorise those medical doctors as emigrants whose 'disappearance' lasted exactly from the beginning of January until the end of December in a given year and who had worked in the same workplace in the months preceding the disappearance as after the return. In such cases we assumed that the employer failed to report the individual for the given year to the Pensions Directorate. In the case of some of the omitted observations it is possible that the individuals have in fact entered employment abroad on a yearly fixed-term contract. Due to these restrictions, we give a lower bound estimate on emigration. As a consequence, in the first and last three months of the observation period the number of out-migrated

¹ Detailed description of the sample see in [Varga \(2015\)](#).

is likely to be an underestimate, as only the notified out-migrated could be identified in these months.

To analyse the changes in the out-migration of medical doctors we used time-to-event analysis. The time-to-event analysis is a set of statistical methods for analysing longitudinal data where the outcome variable is the time passed until the occurrence of an event of interest. The event is defined as the transition from one state to another as, in our case, the quitting of the Hungarian health workforce for different reasons. Because those who leave the health workforce may do it for various mutually exclusive reasons, (out-migration, attrition, exit from employment or death) we used competing risk models (*Fine and Gray, 1999*). A competing risk is defined as an event whose occurrence precludes or alters the probability of occurrence of the main event under examination. (In our case, the individual either emigrates, or goes on to a job outside the health sector, becomes inactive or unemployed or dies.) The Fine and Gray model defines separate sub-hazard functions for each event. The subdistribution hazard is the immediate risk of leaving the profession on account of a particular cause, given that the subject has not left the job before as a result of the given cause.

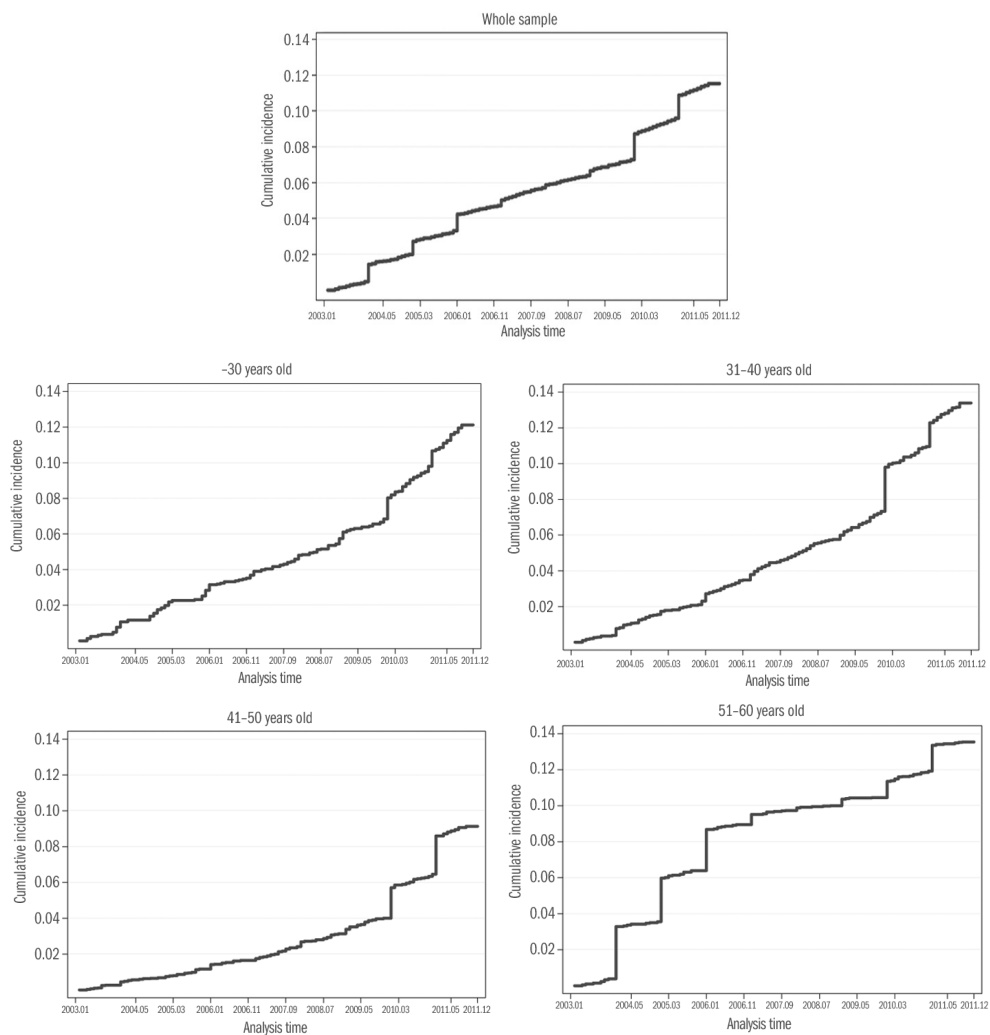
The independent variables in our models were: gender, age, region of residence (according to the 2003 year classification), a dummy variable indicating whether the individual was a general practitioner or a specialist doctor versus a dentist, and the relative labour income of the individual – that is the average labour income of the person in the preceding months as a ratio of the average national labour income during the same period (calculated from the source sample). The income from employment of medical doctors also contains any informal payments the individual doctor listed in their tax statement. It might be that some tax statements include only a part of the real amount of such payments. We could not address the problem of such possible hidden income in this study.

As the different observable characteristics might have a different effect on the probability of emigration at various points of the life-cycle we conducted the analysis for the whole sample and also for subsamples of five age groups: younger than 31 years old, 31–40 years old, 41–50 years old, 51–60 years old and 61–70 years old. Medical doctors older than 70 years were included in the whole sample, but we did not conduct a separate analysis for them.

The competing risk analysis was performed for all the competing events.² In the following we present the results only for emigration. *Figure 2.4.1* shows the cumulative incidence functions of out-migration for the whole sample and the different age groups as predicted by the competing risk models. The cause-specific cumulative incidence function gives the proportion of doctors at time t who have left the profession for a given cause (in that case because of out-migration), accounting for the fact that the job can also be left for other reasons (attrition, exiting employment, or death).

² For detailed result see [Varga \(2015\)](#).

Figure 2.4.1: Cumulative incidence functions – emigration



For the entire sample the following can be observed in the changes of emigration of medical doctors. Between January 2003 and March 2010, 7 percent of practising physicians left the country. Until March 2010, there was a steady outflow which speeded up after March 2010 and was followed by a further acceleration after May 2011. Between March 2010 and April 2011, another 5 percent of Hungarian medical doctors left the country. The increase in May 2011 shows the effect of the end of the transitional period of restrictions on the free movement of labour from EU8 countries to Austria and Germany. The reasons for the speed-up after March 2010 need further investigation.

The changes of the probability of out-migration for the different age groups show the following: between January 2003 and December 2011 the 31–40 year old group of medical doctors moved abroad in the largest proportion. By the end of the period discussed, 14 percent of them had found a job abroad. Nearly the same ratio of 51–60 year old medical doctors had moved abroad, but the dynamics of outflow were different in the two groups. Just after the EU accession the 51–60 year old doctors had left the country at the fastest pace: between May 2004 and January 2007 10 percent of them had left the country. It was probable that they could take advantage of their previous professional contacts to find suitable jobs. After this period the outflow of the 51–60 year old group stopped until March 2010. The pace of their out-migration increased again with a further increase after the 101. month, which marks the end of the transitional period of restrictions on the free movement of labour from the EU8 countries to Austria and Germany. Between March 2010 and December 2011 an additional 4 percent of the 51–60 year old medical doctors found a job abroad.

The outflow of the 31–40 year old group on the other hand was steady until the end of March 2010. Until that time 7 percent of this group went abroad. After March 2010 the outflow speeded up and the end of the transitional period of restrictions also increased the probability of out-migration in this age-group. Between March 2010 and December 2011 a further 7 percent of the 31–40 year old medical doctors found a job abroad.

The dynamics of the outflow among the youngest medical doctors – younger than 31 years old – was very similar to that of the 31–40 years old group. Until March 2010 there was a steady outflow and 7 percent of the most inexperienced doctors went abroad, after which the outflow accelerated followed by a further increase after the end of the transitional period of restrictions on the free movement of labour in this age-group as well. Between March 2010 and December 2011 a further 5 percent of the youngest doctors went abroad.

The 41–50 year old medical doctors left the country in the lowest proportion. Until March 2010, only 4 percent of them had left the country, but their rate of emigration also increased first after March 2010 with a further increase after May 2011. 6 percent of them left the country between March 2010 and December 2011.

Table 2.4.1 summarises the results of the separate competing risk models for out-migration, the subhazard rates for the whole sample and the age-group specific subsamples. A subhazard rate greater than 1 implies an increased probability of out-migration while a rate less than 1 implies a decreased probability. For instance, in the model for the whole sample, the subhazard rate is 1.29 indicating that the likelihood of emigration of men is 29 per cent higher than for women. Similarly, a one-year increase in the age of the medical doctor will decrease the probability of emigration by 2 per cent (the subhazard rate is 0.98).

**Table 2.4.1: Competing risk models (subhazard rates) – out-migration
(Competing risks: attrition/exit from employment/death)**

Variable	Subhazard rates				
	Whole sample	-30 years old	31-40 years old	41-50 years old	51-60 years old
Gender (Male = 1)	1.29*	1.56*	1.79*	ns	0.80**
Age	0.98*	-	-	-	-
Relative labour income	0.88*	0.47*	0.61*	0.88*	1.09**
Region					
Western Transdanubia	ns	ns	0.64**	ns	ns
Other Regions: Central Transdanubia/ Southern Transdanubia/Northern Hun- gary/Northern Hungary/Northern Great Plain/Southern Great Plan	ns	ns	ns	ns	ns
General Practitioner or Specialist doctor	ns	ns	2.37*	ns	0.68*

Reference category: female, dentist, Region: Central Hungary.

Significant at *5 per cent, **10 per cent, ns: not significant.

The results show that for the whole sample men out-migrate with a higher probability than women. In the entire sample, there is no significant difference in the likelihood of out-migration of physicians and dentists. There are no regional differences either. Relative labour income has a significant effect on the emigration decisions of medical doctors: those whose labour income is lower compared to the national average emigrate with a higher probability than those whose relative employment income is greater. The results of the competing risk models for the different age-groups show that among young doctors (younger than 31 years old and 31–40 years old), men out-migrate with a higher probability than women. In the age-group of the 41–50 year old, there is no significant difference in the likelihood of out-migration between males and females. Among the 51–60 year old medical doctors women out-migrate with a higher probability than men. As for the effect of the relative labour income the following can be observed: those young physicians and dentists (younger than 31 years old and 31–40 years old) whose relative employment income is lower, emigrate with a higher probability, suggesting that in their decisions to out-migrate income situation plays a decisive role. The size of the effect decreases as we move on towards the older age-groups meaning that the influence of other factors is greater for the oldest. Those 51–60 year old medical doctors go abroad with a larger probability whose relative labour income is greater than that of the other doctors of the same age and with similar other observed characteristics. It does not mean that income does not have a role in the out-migration decisions but rather suggests that the more successful older medical doctors go abroad with a larger probability. There are significant differences in the likelihood of out-migration in some of the age groups between physicians and dentists. The 31–40 year old

physicians move abroad with a probability twice as high as that of the dentists. Among the 51–60 year old group physicians out-migrate with a 32 per cent smaller chance than physicians.

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