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HEALTH WORKERS' MIGRATION DURING THE CRISIS AND POST-CRISIS PERIOD: A CASE OF ROMANIA

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Abstract

Health is one of the critical sectors with impact on economic and social outcomes, as it is linked to productivity, human capital and resources' availability contributing thus to economic growth and the sustainable development of society. Migration seems to be more and more evolving beyond the traditional push and pull factors documented exhaustively by the specialised literature. In Romania, the migration/mobility of health workers is the prevalent topic of concern, next to the quality of medical services, their availability, and the numbers of physicians both within the public and private sector. Their increased propensity for migration seems to exceed the well-known and documented push and pull factors of migration, as the pattern for taking the decision to migrate seems to contain considerations exceeding traditional individual aims. Therefore, economic-social analyses in this respect are of pressing interest and concern.

The present paper intends to provide a brief analysis of the size and structure of the migration flows of Romanian health workers in the complex crisis and post-crisis European context as well as a short-term forecast. Moreover, it displays also the limits in applying analysis and forecast models as result of the few and scarce statistical data in the field.

Key words: physicians, brain drain, health sector, health workers migration, European Union, Markov model

JEL Classification: C32, C60, F22, I15, J61

Introduction

Healthcare sector is one of the critical sectors with impact on economic growth and sustainable development. It contributes to defining the quality of life in all countries of the world, together with other relevant indicators for economic and social targets and goals.

The nature of healthcare and of other related auxiliary and ancillary medical and social services has changed rapidly in the second half of the last century, and the change pace increased in the first decade of the 21st century due to technological innovation put to good use in the field of health.

Globalisation and the EU-accession of Eastern European countries in the nineties contributed to increasing the awareness about the developments and relevance of the sector. Both developments triggered the liberalisation and free movement of services and human capital, implicitly of workers in the field of health and associated social services. This means increased competition for ensuring the necessary staff, under the conditions of demographic pressure for the most developed countries in need of higher numbers of medical personnel.

Inevitably, the countries registering most losses are the less-developed and developing countries, where the push and pull factors of migration for health workforce act in favour of migration to developed countries.

The structural reforms, conjugated with the economic-financial crisis have impacted the migration/mobility trend, and made even harder the retention of skilled staff in some developing countries, including here some of the central and eastern-European member-states (see e.g. Strielkowski and Čábelková, 2015).

The demographic situation at European level shows both facets regarding the relevance of the health and associated social services sector: on one hand, higher older ages are the outcome of better living conditions, better medical and social assistance, and of encouraging a more active and involved life also at old age. On the other hand, this increases the demands addressed to the public and private health sector with respect to the required personnel for ensuring the good functioning of the system.

Demographic ageing data indicates that by 2030 the numbers of those in the age group from 15 to 64 years of age will decrease by 14.4 million individuals and by 45.6 million in 2060. At the same time, the age group over 65 years of age will be of about 37.1 million persons (2030) and about 65.1 million individuals in 2060. Therefore, a series of questions and issues emerge closely linked to the capacity of the European systems to deal with the specific requirements of these developments.

One system that plays a crucial role is the health and related social services sector at world level: while it was one of the sectors ensuring high rates of employment even during the crisis (17.1 million jobs), that is 8% of all jobs in EU-27 (2010), it is also the one showing one of the highest workforce deficits, as the gap is estimated to be about 1000000 jobs in 2020¹. Indicative is the fact that while in the period 2008-2011 were lost more than 5 million jobs, in the same time the health sector ensured employment for + 2.8 million jobs. The estimated health workforce deficit is about 4.3 million workers, as more than 75 countries show less than 0.25 health agents per 1000 inhabitants, while the norm would be of 2.5 health agents/1000 inhabitants in order to achieve the minimum health standard goals.

The overall employment in the healthcare sector increased in the EU for the period 2000-2010 by 21% that is about 4 million new jobs. The increasing need for healthcare and related/ancillary services ensured employment growth for the sector even during the financial-economic crisis, as 770000 new jobs were created in 2008-2010. If we add to this also the youth-related dimension we can obtain an even better image of the sectors' relevance for the economy: during the crisis, the overall employment rate of youths fell by 11.3%, yet in the healthcare sector youth employment registered an increase of 3%, identified especially in relation to human health and residential care jobs². All in all, the growth rate of the sector in the period 2010-2020 is estimated to be of about 5%, which is higher than the average EU-28(27) growth rate of 3%.

Lacking competences and the inequalities in access to health services are core issues in a context in which external mobility and migration of the health workforce only contribute to augment the critical situation of the system. In 2006, the World Health Organisation showed that the world was facing a health workers' deficit of over 4.3 million, and around 2010, the deficit was already estimated at 7.2 million health workers for the world as a whole, and if

¹ *Feasibility Study on EU level collaboration on forecasting workforce needs, workforce planning and workforce trends in health*. <http://ec.europa.eu/health/workforce/>

² *Commission Staff Working Document, on an Action Plan for the EU Health Workforce*, Communication from the Commission to the European Parliament, The Council, The European Economic and Social Committee And The Committee Of The Regions SWD (2012) 93 final, Strasbourg, 2012, <http://ec.europa.eu>

nothing changes, by 2035 the deficit will be of about 12.5 million³. At European Union level, but also at global level the last decades were marked by an empirically noticed and statistically reinforced, yet relatively less analytically studied, analysed and documented phenomenon: the migration of health workers from the Euro and the non-Euro Area both inside and outside the EU-28. In this respect we mention that medical systems from Ireland, France, Belgium, Germany and UK rely heavily on the medical staff attracted according to the EU granted mobility from member-states of Central and Eastern Europe.

A particular case is Romania, where the mix of reforms inside other reforms – an unnecessary ‘Matryoshka principle’ - has triggered a chronic crisis and emergency state for the health system.

The external mobility/migration of Romanian health workers has complex reasons and shows an upward trend, thus aggravating the structural crisis of the public health system. Statistics regarding the health workers’ mobility are scarce, and the evolution in the crisis period increased the outflows. For Romania, one of the recent EU member-states (EU accession in 2007), the health professionals’ brain drain has a net negative effect at economic and social level. Yet, how can it be regarded within the EU-28? Is it migration or mobility for health workers? Where should the fine line be drawn, as external mobility of health workers is not exclusively a non-European Euro Area (EEA) countries towards EEA countries migration process, but rather a flowing process with own push and pull factors that are either stronger, or weaker at times. The international dimension is also relevant, as it is a process increasingly more of world concern. The attempts to identify motivations and incentives, as well as retention strategies for the medical workforce are largely covered by the specialised literature. The present paper intends to present current concerns regarding migration and/or mobility of Romanian health workers. The discussion is justified by the complex reasons of this upward trend as it worsens the structural crisis of the public health system.

For instance, in 2014 it was appreciated that more than 20000 Romanian physicians were working on the Western medical market, and about 14000 from them have left the country after the EU-accession in 2007. Another absolute record was the year 2013, when the number of physicians leaving the country to work abroad was almost equal to the number of graduates in the same year. The chairman of the Medical College from Romania stated in that year that about 3000 physicians left the country, while 2900 students graduated from Romania’s medical schools⁴.

Developed countries gained young, well-trained, and professional personnel (general practitioners and specialists, dentists, nurses, caretakers, a.s.o), due to this more than ever economically and professionally justified mobility/migration of physicians and other skilled medical staff. Actually, this is also the generation able to ‘bridge’ the gap between the ‘old school practice physicians’ and the young generation of medical experts with skills overreaching the borders of their own vocation and profession. These young professionals covering a wide range of medical departments – from general practitioners (GP) to high-tech expertise fields of medical practice - are able to work with, and in complex environments and perform refined, integrated interventions, according to the best existing practices and standards.

This is the case also for Romania where critical issues have still to be dealt with, despite several attempts at ‘reinventing’ the health care sector based on reforms, measures and policies aimed both at the health care personnel and patients. Among the most pressing are the coverage of the ‘core set of medical goods and services’; the minimal package of health care

³ World Health Organization (2014): *A Universal Truth: No Health Without a Workforce*, Geneva, WHO Press, www.who.int

⁴ Available at: <http://cursdeguvernare.ro/migratia-medicilor-in-interiorul-ue-probleme-la-casele-mari-la-casele-mici.html>

assistance; and lately, even the intention of the state to regulate how often population undergoes health checks, based on a 'health ID-card' and a compulsory set of medical investigations.

Literature review

The issue of migration/mobility regarding health workforce increased as importance and relevance in the 1980s and 1990s. A first interesting approach is the one of the American journalist Garret (1994) (*The Coming Plague: Newly Emerging Diseases in a World Out of Balance*) who drew attention to the idea of global health and the relevance of policies exceeding the boundaries of medicine impacting on health issues, at a time when scientific debates on international migration intensified, along with the concerns about physicians' migration from poorer to richer countries.

Considered a world concern, the process intensified also in Europe as the communist regimes collapsed and 'gates' opened for the skilled labour force, including health workforce from Eastern and Central Europe. The competition for skilled workers on increase since the 1960s, intensified yet again exacerbating also the debate on the impact of doctors' migration for their country of origin. The first attempts for debating the ethical issues emerged increasingly more since then (Raghuram, 2009), as their negative effect at society level were debated already (Brown and Connell, 2004).

In the first decade of the 21st century the issue of brain drain, was either a hypothesis to defend (Beine et al., 2001) – the "beneficial brain drain" –, or contested (Hagopian and al., 2005) with the argument that "mobility benefits mainly rich countries to the detriment of poorer ones" a new term was coined (Lowell and al, 2004), respectively the "brains strain" which described the effect of migration of highly skilled people on sending countries and which attempted to state the principle of both positive and negative consequences.

Yet, the debate continued to intensify and studies of Buchan (2007), Wismar (2011), Glinos et al. (2014) show that the issue of health workers' migration at European level, the push and pull factors, and all theories need further enquiry and embedding in the corresponding economic and social context. More than ever, the networked society draws attention to the relevance of the network theory and to the conceptual framework of trans-nationalism and circular migration. Preceding theories of the nineties, influenced by Walt and Gilson (1994) had more an approach from the perspective of implemented policies and their effect on either the country of origin or on the country of destination, of stakeholders in the necessary policy reforms and the context and content of the respective reform.

In our opinion, a sound approach would imply to take into account the trends identified by Castles and Miller regarding contemporary migration (2009) for understanding the current international migration of physicians (as quoted in Guo, 2010). This is relevant as physician migration is represented both by prestigious professors and general practitioners, and this is indicative for the role played by economic shocks and inequalities in socio-economic opportunities (Astor et al., 2005; Brown and Connell, 2004; Okele, 2013).

However, the politisation of migration (Guo, 2010) is also increasingly more relevant in relation to "Fortress Europe", and to the mobility/migration propensity of Romanian physicians. Weber's push and pull model (2009) is used by Boncea (2014), Dornescu and Manea (2013), and Feraru (2013) to debate the two subcomponents of brain drain: international migration a consequence of push factors (level of payment, cost-benefit analysis), or of pull factors (professional motivation, incentives, working conditions, etc.).

The analysis and forecast of professionals' mobility/migration from the healthcare sector in the framework of a global approach was realized by very few studies. One of the reasons frequently invoked is the lack of data. Most time, the databank is supplied by medical

associations and institutes of statistics⁵, based on surveys from a reduced number of countries, etc.

In most countries, the only source of available data for estimating the exits is the number of applications for certificates acknowledging studies and licenses, or data obtained from questionnaires about the intention of physicians to work abroad. These data have a limited reliability regarding the circulatory trends of physicians because not all physicians applying for certificates or intending to leave the source-country actually proceed with this intention. Moreover, not all the countries request systematically these certificates and this could lead to underestimating migration (Wismar et al, 2011; Mullan, 2005, Docquier-Bhargava, 2007). În plus față de dificultățile de măsurare a migrației spre exterior, știm mult mai puțin despre modul în care s-a schimbat migrația de întoarcere. To the difficulties of measuring outwards migration, is added the fact that we know less about the way in which return migration changed. The few studies investigating return migration used survey data to analyze its dimensions (see for instance, Williams-Baláz, 2008).

Gravity models (Steinkopf, 2012) were used to explain bilateral flows of medical personnel between origin and destination countries, based on the corresponding country characteristics.

The Markov-type models were developed for forecasting demand and supply of medical personnel on short- and long-term for various specialisations (Dussault et al., 2010; or Roberfroid et al., 2009).

It is, finally, about the fine-line to be drawn between health workers' mobility and migration at EU-level, when considering the policies in the field, and issues regarding specific programs of recruitment for health workers (mostly physicians), incentives, and also types of compensations that should be used for alleviating the negative effects.

Patterns and trends of migration and mobility during the crisis

Economic and financial crisis has put forward several conundrums, highlighted serious issues of economic and social nature, and emphasised the critical importance of effective policies for the health sector. In order for the policies to be effective, a fresh discussion should be initiated about the institutional setting, about what could make it more attractive for the workforce in the medical field. Firstly, it is important to distinguish between migration outside and towards the EU, and mobility of health workers within the EU. The terms are related, and sometimes one is used in lieu of the other. Yet, mobility has an added meaning which is stipulated especially by EU directives and, in particular, by Directive 2005/36/EC on the recognition of professional qualifications, which in 2013 was being modernised by the European Commission, the European Parliament and EU Member States (European Commission, 2013). This new directive (Directive 2013/55/EC) – connected to the others regarding free movement of workers supported by the secondary legislation – ensures the recognition and portability of medical professional qualifications (medical doctors, dentists, registered nurses, midwives, a.s.o.)⁶. However, this provides only for the automated process, as it does not mention anything about the selection based on individual professional skills and competencies, but just the conditions with respect to periods of training, training levels, etc. which need to be met. This directive opened the gates for health workers from the countries of Central and Eastern Europe (CEE) to work in the EEA countries, to have better earnings and

⁵ Moullan Y., Bourgueil Y., (2014), *The International Migration of Doctors: Impacts and Political Implications*, Questions d'économie de la santé n°203 - November 2014, www.irdes.fr

⁶ Directive 2005/36/EC is the directive in which the EEA is consecrated as the largest region in the world with "free" mobility of health professionals. This area includes 3 EFTA countries (Lichtenstein, Iceland and Norway), next to the EU-28 countries and Switzerland which even though an EFTA country has a separate bilateral agreement with the EU, <http://eur-lex.europa.eu/LEXUriServ/>

professional prospects. It also compounded the difficulties in their source-countries, faced on one hand with the need to operate structural reforms of the system (including here austerity measures during the crisis), and on the other hand with the loss of (often young) highly-skilled trained health workforce for which investments were made during their education and training period. The scarce statistical data, as well as findings in receiving countries show some trends that are indicative for mobility inside the EU in particular, as well as for migration, in general: i) highlights the importance of Euro Area neighbourhoods, as first preference; ii) the mobility from Central and Eastern will continue and numbers are not very high as Euro Area countries are still actively recruiting from CEE countries; iii) CEE countries are net providers of health workers for EEA and the world; iv) the language barrier makes some countries less attractive than the others for CEE health workforce (Netherlands, Sweden, Germany, etc.); v) CEE countries in absence of 'attractive' reform packages for health workers will run increasingly higher risks regarding the entire sector.

Without entering into conflict with the free movement of individuals, the labour rights, and the individual's right to chose best paths to personal fulfilment, some actions and policies should still aim to alleviate the damaging effects of this mobility which is one-directional (from the CEE to the Old Member States).

Another relevant issue for most European countries, and in particular on the agenda of EU-28 is the so-called "retirement bulge" a direct consequence of the combined action of demographic ageing, smaller cohorts of young individuals as in previous decades attending medical schools at upper-secondary and higher-education level. Thus, the estimates show that the EU in 2009 registered over one-third of the physicians over 55 years of age, and that around 2020 more than 3.2% of all physicians in the European Union are expected to retire annually (European Commission, 2012). The major implications of migration, in this context, could be divided into several categories that would require future monitoring based on "push" and "pull" factors, but also on the economic, social and demographic conditions.

The Code of Good Practice formulated by the World Health Organisation (WHO) (2004) is an initiative that has the frail backbone of voluntary action also in the final version adopted in 2010. It addresses the issue of health workforce migration by trying to find the optimum mix between the needs of the developing and developed countries. The main objectives and provisions of the code are intended as overall rules for the recruitment of medical staff. It has, in this respect even a 'backdoor' as medical workforce from the non-Euro Area of EU are no longer regarded as migrants, but as expression of the EU-wide mobility of labour force, in general.

Mobility and migration of health workers: a case of Romania

Romania's particular case is marked by two distinct periods in the historical development of the medical health-care system: the period before 1989 and the immediate period thereafter, which was the turning point in Romania's contemporary history. This distinction is necessary, for understanding on one hand the need of structural reform for the medical health care system of Romania after the collapse of the communist, centralized economy.

Historical outlook on the Romanian health care system

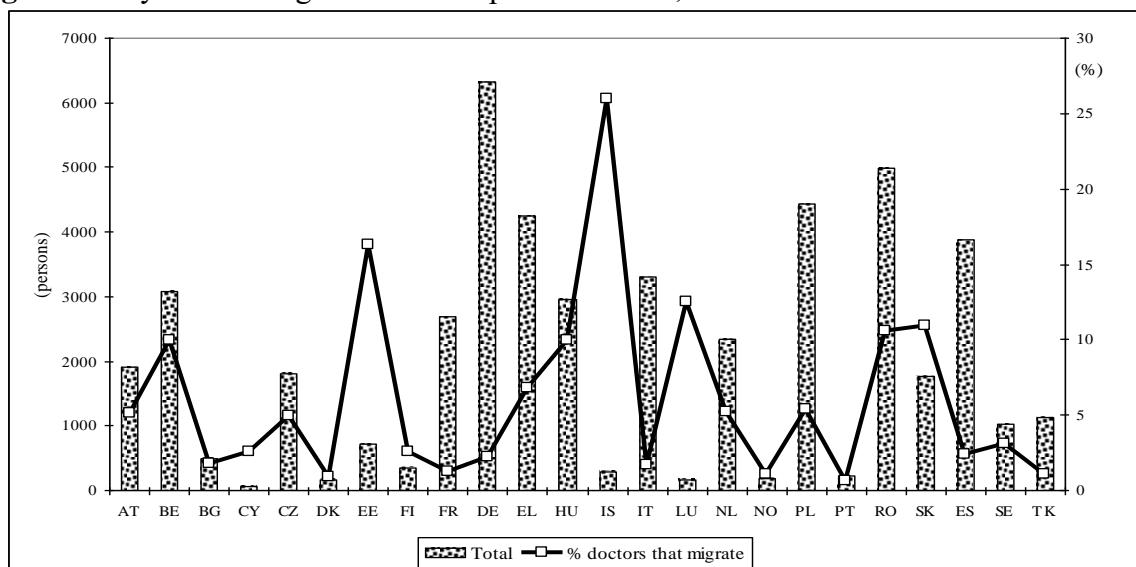
During the period 1949–1989 there was a Semashko health care system⁷ which left its fingerprints also while undertaking the in-depth structural reform of this sector after 1990, expressed in difficulties perceived as such both by the health workers and patients. The

⁷ This system, called so after the first health minister of the USSR, is a completely state-owned and controlled one, and therefore, in principle, free of charge and accessible to all.

institutional building of the system included: free of charge upper-secondary training for nurses or other type of medical care workers. These schools were regarded as improving the chances to be admitted for further free of charge higher-education in the medical field. The centralised, planned system provided for at least one major hospital and other types of medical hospital-like care units that were scattered in the urban and rural areas of the country. Also, all costs and expenditures of the system were paid by the state public budget and strict accountability provisions were in force with respect to the performance of the system (in particular child-birth control and child-birth, followed by mental health-care but in this case with amendments, similar to the ones for the care of individuals with various physical disabilities)⁸.

After 1990 reforms were initiated and by 1995, the centralised, tax-based system began changing into a decentralised and social health insurance system based on multiple financing sources, while the private health care system began to be intensively promoted. The aim was to succeed in implementing market-based competitive contractual relationships between health insurance funds and health care providers. Unfortunately, these contractual relationships are still dysfunctional, and a lot of questions arise with respect to the honesty of some of the transactions and the efficient management of resources for health, as the health system in Romania continues to be heavily indebted to providers of pharmaceutical products and medical technologies. Therefore, the reform period has not yet ended for the health sector.

Figure 1: Physicians' migration in European countries, 2011



Source: EU level Collaboration on Forecasting Health Workforce Needs, Workforce Planning and Health Workforce Trends – A Feasibility Study (2012), Available at: www.ec.europa.eu/health/workforce/.../health_workforce_study_2012_report_en.pdf

However, the changes required by the long transition period, the policy of containing costs – especially regarding wages – and of modernising the health and care system with as few investments as possible, despite public statements to the contrary, had discouraging effects for several categories of individuals who planned, were involved or intended to pursue a medical career at various levels, from nurses to highly-skilled and specialised physicians.

The Prometheus statistics 2011 indicated that the developments in physicians' migration place Iceland, Estonia and Luxemburg in the top of countries with high rates of physicians' and

⁸ The situation of the mental- and disabilities healthcare system before and after 1990 should be a topic in itself.

nurses' migration even if these diminished (25.91%; 16.29% and, respectively 12.46%), while Romania maintained its high emigration share (10.6%) of health workers (Figure 1).

Frequent destinations, especially among physicians, seem to be Great Britain, Germany, France and Switzerland in Europe and outside Europe the United States, Canada, Australia and New Zealand. In 2011, the highest flows of physicians were recorded in Spain, Great Britain, and Germany, as in these countries were registered 8282, 5022 and, respectively 1583 foreign physicians born and trained abroad. Still, only a limited number of countries reported about the share of migrant physicians in total physicians within their health system. According to the project PROMETHEUS 2011, the highest share is registered in Great Britain (42.6%), followed by Austria (13.5%), Hungary (4.7%) and Poland (2.7%). Regarding the share of migrant physicians, in 2008 Slovenia registered 22.5% (1497). In 2010, according to Prometheus 2011 statistics, in France were registered with the National Association of Physicians 10165 foreign physicians.

However, the situation changed in the year 2014, when in Norway, Ireland, Great Britain and Switzerland the weight of migrant physicians in total physicians registered with their health system exceeded over 25% (Norway 37%, Ireland 36.5%, Great Britain 28%, and Switzerland 27%).

Regarding the migration of certified nurses, the most desired countries in 2014 were Switzerland where the weight was of 18.5 pp, Great Britain (12.5%) and Germany (1.05%).

Profiling the future of health workforce in Romania

The statistics regarding the number of physicians in relation to the population of the country place Romania on the second last position in the European Union⁹. According to Eurostat data, in Romania there are 2.6 physicians per 1000 inhabitants, under the European average of 3.4 but also below the level of other EU countries such as France, Germany, Spain and Italy. On the last position is Poland, with 2.2 physicians per 1000 inhabitants. However, in January 2015, the Chairman of the Romanian College of Physicians' stated that 39000 physicians have free practice licences in the country, which implies that in relation to Romania's population (20 million inhabitants), there are 1.95 physicians per 1000 inhabitants. The difference between these two data sources result from the fact that international statistics use the total number of physicians, including also residents. In this context, it would mean that Romania has about 13000 residents. If to them are added also the dentists from Romania, than we have 3.4 physicians per 1000 inhabitants.

The estimates of the Romanian College of Physicians indicate that yearly in the Romanian medical system enter 3000 physicians and almost 3500 exit this health system. The migration of physicians increased annually, and in 2014, 2450 physicians requested professional certificates for leaving abroad. Romania supplied in the last 10 years other countries of the world with health workforce worth 600 million Euros.

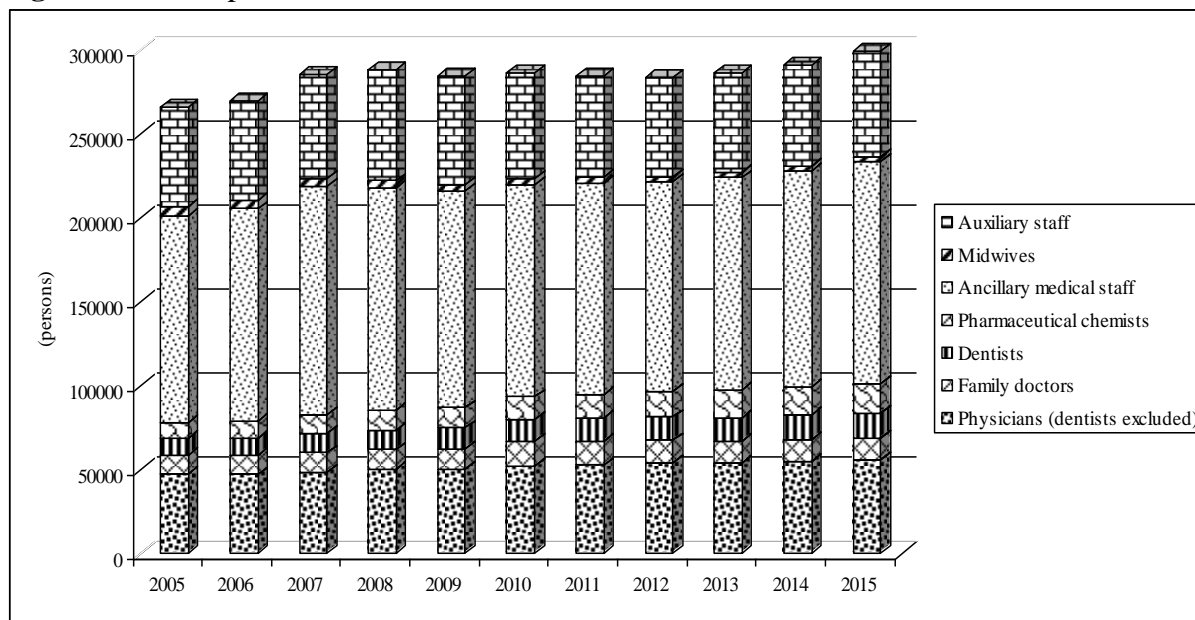
The most concerning situation is encountered in hospitals where the number of physicians remained of only 13521 (as compared with 20648 in 2011 and 14487 in the year 2013) at a necessary of 26000 according to the normative of the Ministry of Health. This state-of-affairs is amplified by the phenomenon of ageing of the physicians working in hospitals: 2961 are over 60 years of age, 2610 are between 50 and 60 years of age, 3642 have ages between 40 and 50 years, 3901 have ages between 30 and 40 years and only 407 are less than 30 years old.

The number of physicians from Romania increased in the last decade by 18.4% (Figure 2), and the numbers of medical personnel with upper secondary training by about 8%, yet the

⁹ Eurostat statistics, www.eu.europa.eu,

graduates of the tertiary medical education who enter in the labour market cannot cover the gap and meet the demand of specialists required at local level. Many young individuals have opted and are still considering leaving the country in order to work in the healthcare systems from abroad.

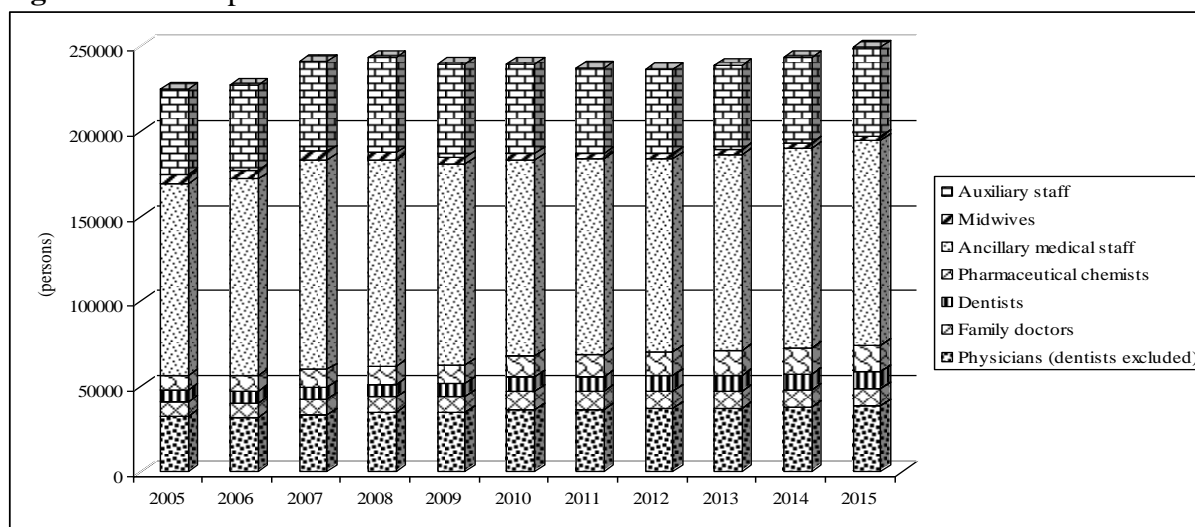
Figure 2: Development of the health workforce in Romania



Source: TEMPO-online databank (2017), National Institute of Statistics (2017). Available at: www.insse.ro

One of Romania's characteristic features is that women are a majority in the healthcare system. Thus, women represented, in 2015, 68.9% from total physicians and 66.47% from total dentists. In the pharmaceutical sector, as well as in the nursing personnel, women are almost the majority (89.6%, respectively 91.3%). The same situation is encountered for auxiliary medical personnel, where the weight of women (83.2%) is higher (Figure 3).

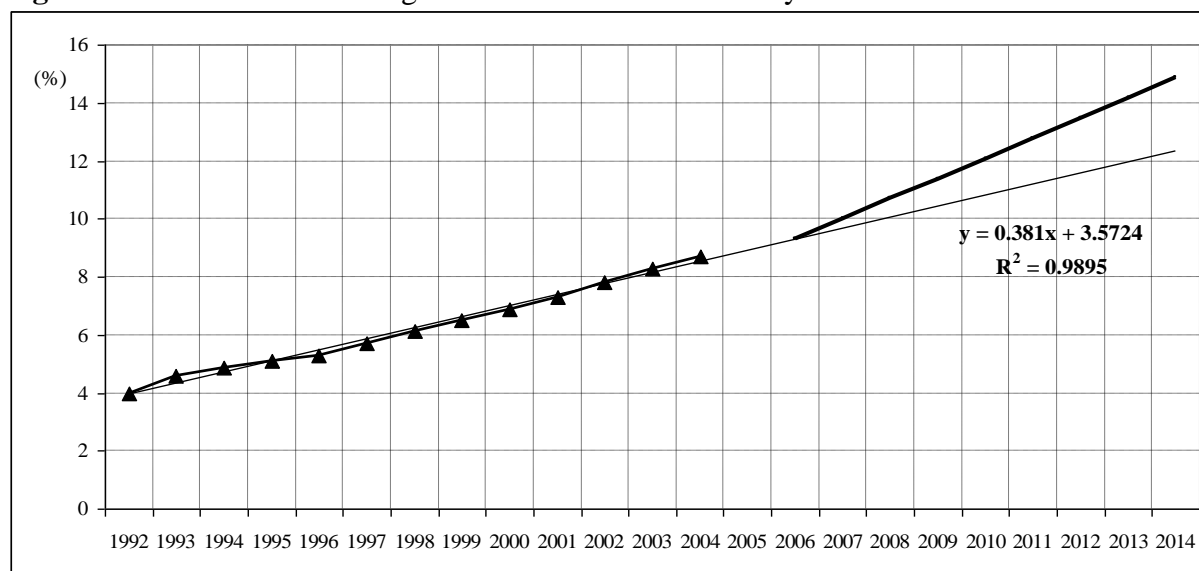
Figure 3: Development of the women health workforce in Romania



Source: TEMPO-online databank (2017), National Institute of Statistics (2017). Available at: www.insse.ro

Regarding the size and structure of migration flows for the Romanian medical staff, Romania is facing the same lack of data about this phenomenon as other countries. In the paper “*Modelling the Effect of Physician Emigration on Human Development*” by Alok Bhargava, Frédéric Docquier and Yasser Moullan (2010), are analysed the migration flows of physicians from 31 European countries, Russia and the United States for the period 1992-2004. Thus, for Romania the trend was increasing, as the emigration share of physicians was of 8.7% (Figure 4).

Figure 4: Evolution of the emigration share of Romanian Physicians



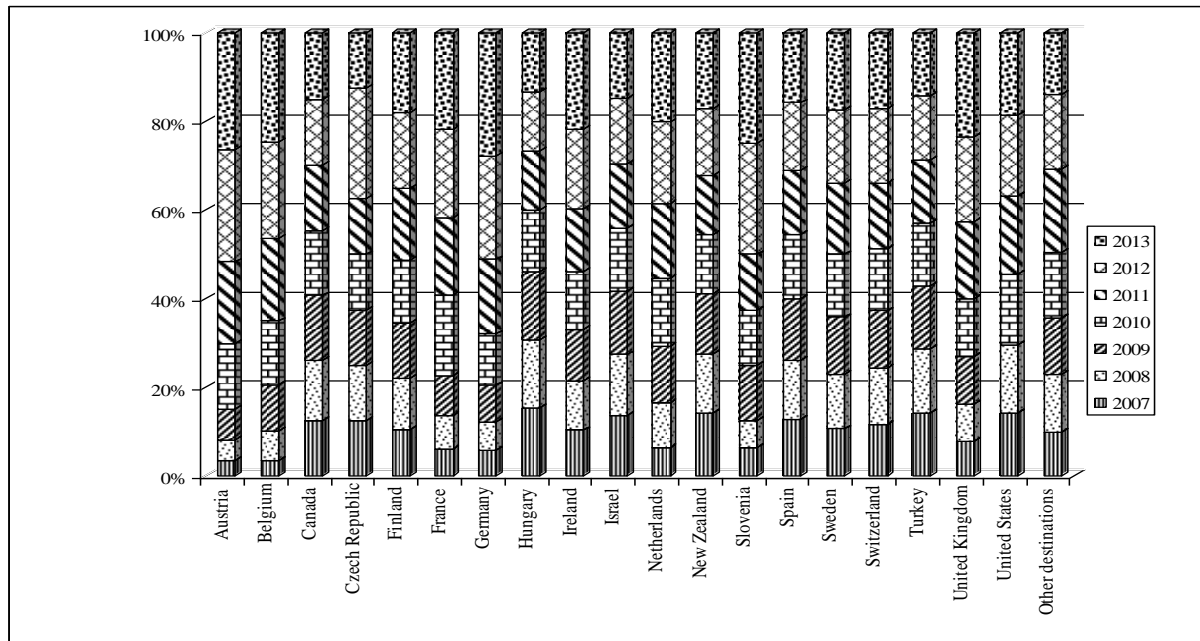
Source: Own results based on Bhargava et al. (2010)

Following the historical trend, based on the available statistical data mentioned above, for 2014 is estimated a stock of practicing physicians abroad originating from Romania of 12.5%. Considering the estimates of experts related to the intensification of the external mobility flows during the crisis (which are based on the demands for free practice licences required annually, the trend is adjusted on a more marked slope, so that the estimated stock reaches 14.86% (Figure 4).

Regarding the distribution on countries of the Romanian migrants, the analysis of the data provided by Gaetan Lafortunein¹⁰ indicates that the highest number of physicians emigrated in the period 2007-2014 in France (15667), the United States (13260), Hungary (12216), Germany (10945), Israel (8173), Belgium (3973) and Great Britain (3236) (Figure 5).

The statistics about the migration of the health workforce for Romania present analysis difficulties as an adequate databank is lacking. Practically, the total number of physicians and nurses working abroad cannot be estimated, the OECD or European Union statistics highlighting only the stock of Romanian immigrants in host countries.

¹⁰ Lafortunein, G., (2016). *Monitoring Health Workforce Migration through International Data Collection: Progress with OECD/Eurostat/WHO-Europe Joint Questionnaire*, EU Joint Action on Health Workforce Planning and Forecasting, 18-19 February 2016, Varna, [www. https://www.oecd.org](https://www.oecd.org)

Figure 5: Distribution on OECD countries of migrating Romanian physicians (2007-2014)

Source: OECD (2016)

Estimating physicians' migration from Romania: Markov models and its forecasts

Brief presentation of the model

Labour force mobility in general, and the mobility of the medical personnel in particular, is one of the social phenomena depending on many multiple factors. Due to the fact that statistics regarding the level and structure of migration flows of medical staff are very concise at best at world, European and national level, the analysis and forecast of this phenomenon by econometric techniques would not lead to pertinent estimates. Therefore, within this paper, for forecasting the number of migrating physicians from Romania the Markov chains were used.

Assumptions of the model:

- if we consider a corresponding time scale, that part of labour force can be identified that suffers changes from one-time period to another;
- at a given moment, a physician can migrate in any of the m 'considered countries';
- the number of employees in the system is assumed to stay the same for the entire period of analysis (because from the statistical data provided by the National Institute of Statistics of Romania, the annual variation in the numbers of physicians is not significant);
- the number of physicians within the health system recorded at regular time intervals as the number of migrating employees as well during any interval are both known;
- their distribution is also registered;
- the experience, working conditions, current wage incomes of physicians influence their decision to migrate.

Let $\{S_n, n = 0, 1, 2, \dots\}$ be the state of employees in the health sector at a given time and n the number of observations, and the space of S_n states is $\{0, 1, 2, \dots, m\}$ representing the m countries to which physicians migrate.

The matrix of transition probabilities can be estimated by using statistical data and

information about the characteristics of labour force mobility in the respective countries.

The bias of a certain category of physicians not to migrate determined the division of the physicians' population into two categories: one for those individuals who do not migrate, and the other including the individuals who migrate.

If m destination countries are considered, with s_i ($i = 1, 2, \dots, m$) the fraction containing the physicians who do not migrate, then the transition probabilities matrix for the migrating population can be written as:

$$\mathbf{R} = \begin{pmatrix} R_{11} & R_{12} & \dots & R_{1m} \\ \cdot & \cdot & \dots & \cdot \\ \cdot & \cdot & \dots & \cdot \\ R_{m1} & R_{m2} & \dots & R_{mm} \end{pmatrix} \quad (1)$$

The transition probabilities matrix for the entire physicians' population becomes:

$$\mathbf{P} = \begin{pmatrix} s_1 + (1-s_1)R_{11} & (1-s_1)R_{12} & \dots & (1-s_1)R_{1m} \\ (1-s_2)R_{21} & s_2 + (1-s_2)R_{22} & \dots & (1-s_2)R_{2m} \\ \cdot & \cdot & \dots & \cdot \\ \cdot & \cdot & \dots & \cdot \\ (1-s_m)R_{m1} & (1-s_m)R_{m2} & \dots & s_m + (1-s_m)R_{mm} \end{pmatrix} = \mathbf{S} + (\mathbf{I} - \mathbf{S})\mathbf{R} \quad (2)$$

Where \mathbf{S} is the matrix corresponding to the segment of physicians who do not migrate, and this is a diagonal matrix:

$$\mathbf{S} = \begin{pmatrix} s_1 & 0 & \cdot & \cdot & \cdot & 0 \\ 0 & s_2 & 0 & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & 0 \\ 0 & 0 & \cdot & \cdot & 0 & s_m \end{pmatrix} \quad (3)$$

For the first n steps of the transition probabilities, it is assumed that no changes take place in the first category of physicians.

Then:

$$\|P_{ij}^{(n)}\| = \mathbf{S} + (\mathbf{I} - \mathbf{S})\mathbf{R}^n \quad \text{cu} \quad \lim_{n \rightarrow \infty} \mathbf{R}^n = \mathbf{\Pi}' \quad (4)$$

Where matrix $\mathbf{\Pi}'$ has the elements of each line, the vector limit:

$$(\pi'_1, \pi'_2, \dots, \pi'_m) \quad (5)$$

for the category of migrating physicians.

If we consider $\lim_{n \rightarrow \infty} \|P_{ij}^{(n)}\| = \mathbf{\Pi}$, from the relationships (4) and (5) we obtain;

$$\mathbf{\Pi} = \mathbf{S} + (\mathbf{I} - \mathbf{S})\mathbf{\Pi}' = \begin{pmatrix} s_1 + (1-s_1)\pi'_1 & (1-s_1)\pi'_2 & \dots & (1-s_1)\pi'_m \\ (1-s_2)\pi'_1 & s_2 + (1-s_2)\pi'_2 & \dots & (1-s_2)\pi'_m \\ \cdot & \cdot & \dots & \cdot \\ \cdot & \cdot & \dots & \cdot \\ (1-s_m)\pi'_1 & (1-s_m)\pi'_2 & \dots & s_m + (1-s_m)\pi'_m \end{pmatrix} \quad (6)$$

which indicates that the physicians' migration to various countries does not depend on the initial state.

If the initial distribution of physicians in various countries is known, their distribution after n periods of time can be obtained based on the relationships (4) and (6) for $n < \infty$ as well as for $n \rightarrow \infty$.

In practical instances, the use of this Markov model requires estimating the elements of the transition matrices \mathbf{R} and of the number of physicians immigrated to the considered countries.

Obtained results

For the proposed analysis were used the data regarding the migration of physicians from Romania¹¹ during the period from 2007 to 2013 and 10 countries to which physicians migrate, respectively Belgium, Canada, France, Germany, Ireland, Israel, Great Britain, Sweden, Hungary, and the United States.

States 1, 2, ..., 10 are considered as non-recurrent. An additional state was introduced, state 0, which is considered as absorbent.

In a first stage, the components were determined for the vector corresponding to the number of migrant physicians in each of the aforementioned countries:

$$\begin{aligned}\eta(2007) &= (135; 279; 966; 619; 162; 1112; 252; 313; 1883; 1895) \\ \eta(2008) &= (267; 311; 1155; 721; 176; 1125; 273; 363; 1875; 20413) \\ \eta(2009) &= (420; 332; 1401; 895; 183; 1164; 344; 386; 1858; 2086) \\ \eta(2010) &= (566; 330; 2879; 1269; 205; 1168; 423; 421; 1701; 2141) \\ \eta(2011) &= (744; 335; 2726; 1840; 226; 1195; 563; 476; 1652; 2324) \\ \eta(2012) &= (866; 338; 3118; 2559; 286; 1194; 618; 496; 1624; 2430) \\ \eta(2013) &= (975; 339; 3422; 3042; 341; 1215; 763; 512; 1623; 2457)\end{aligned}$$

The performed computations led to obtaining the transition probabilities matrix for migrating physicians, respectively:

$$R = \begin{pmatrix} 0.662 & 0.038 & 0.041 & 0.02 & 0.035 & 0.088 & 0.026 & 0.036 & 0.026 & 0.02 \\ 0.02 & 0.589 & 0.13 & 0.01 & 0.02 & 0.07 & 0.01 & 0.04 & 0.05 & 0.06 \\ 0.01 & 0.09 & 0.391 & 0.04 & 0.03 & 0.02 & 0.15 & 0.09 & 0.03 & 0.15 \\ 0.02 & 0.03 & 0.001 & 0.649 & 0.09 & 0.04 & 0.03 & 0.04 & 0.02 & 0.08 \\ 0.01 & 0.03 & 0.07 & 0.07 & 0.596 & 0.01 & 0.03 & 0.02 & 0.06 & 0.10 \\ 0.02 & 0.01 & 0.01 & 0.02 & 0.01 & 0.699 & 0.01 & 0.04 & 0.06 & 0.03 \\ 0.04 & 0.01 & 0.05 & 0.01 & 0.02 & 0.01 & 0.638 & 0.097 & 0.09 & 0.03 \\ 0.02 & 0.01 & 0.05 & 0.02 & 0.01 & 0.12 & 0.00 & 0.598 & 0.08 & 0.09 \\ 0.03 & 0.10 & 0.05 & 0.01 & 0.01 & 0.02 & 0.025 & 0.028 & 0.634 & 0.09 \\ 0.15 & 0.08 & 0.20 & 0.15 & 0.17 & 0.00 & 0.00 & 0.02 & 0.03 & 0.189 \end{pmatrix}$$

The transition probabilities matrix for the entire physician population of the country becomes, according to the relationships (2):

¹¹ *Monitoring Health Workforce Migration through International Data Collection: Progress with OECD/Eurostat/WHO-Europe Joint Questionnaire*, EU Joint Action on Health Workforce Planning and Forecasting, 18-19 February 2016, Varna, [www. https://www.oecd.org](https://www.oecd.org)

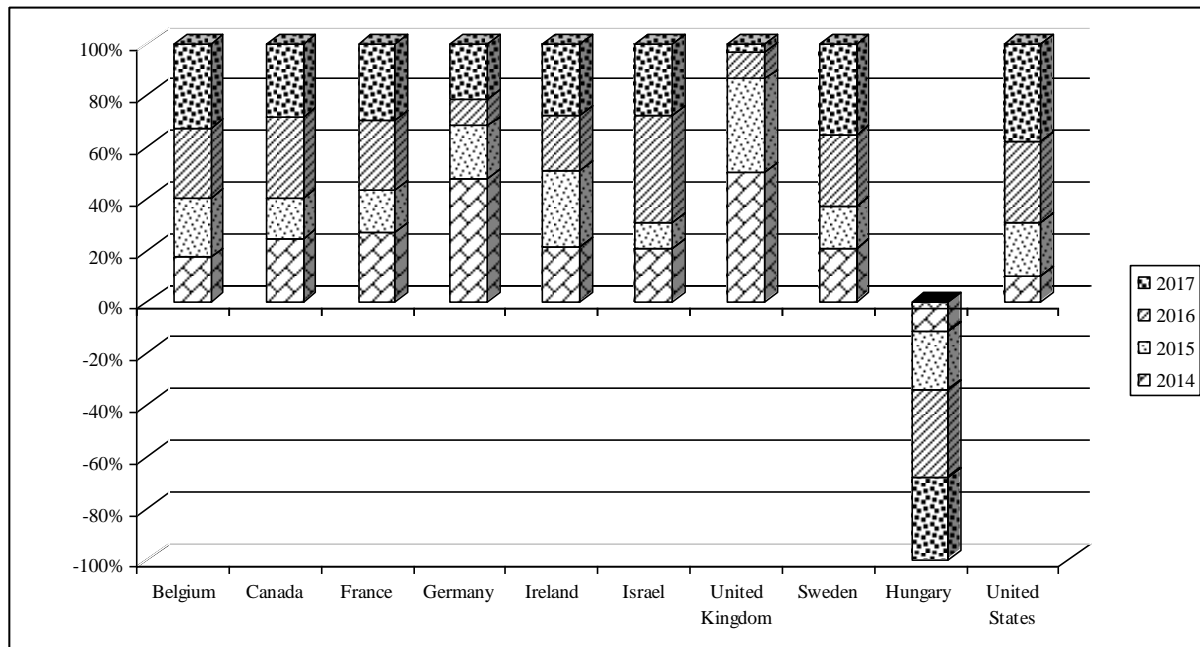
$$P = \begin{pmatrix} 0.831 & 0.041 & 0.032 & 0.023 & 0.001 & 0.010 & 0.000 & 0.003 & 0.000 & 0.041 \\ 0.012 & 0.901 & 0.012 & 0.015 & 0.001 & 0.021 & 0.002 & 0.001 & 0.016 & 0.020 \\ 0.012 & 0.033 & 0.801 & 0.012 & 0.000 & 0.020 & 0.000 & 0.000 & 0.010 & 0.022 \\ 0.053 & 0.005 & 0.011 & 0.882 & 0.017 & 0.001 & 0.000 & 0.001 & 0.000 & 0.037 \\ 0.025 & 0.001 & 0.011 & 0.021 & 0.872 & 0.020 & 0.000 & 0.000 & 0.000 & 0.065 \\ 0.011 & 0.001 & 0.001 & 0.032 & 0.032 & 0.921 & 0.000 & 0.010 & 0.000 & 0.0018 \\ 0.012 & 0.001 & 0.002 & 0.012 & 0.002 & 0.000 & 0.973 & 0.002 & 0.000 & 0.014 \\ 0.001 & 0.000 & 0.000 & 0.021 & 0.001 & 0.001 & 0.023 & 0.951 & 0.001 & 0.007 \\ 0.001 & 0.001 & 0.000 & 0.003 & 0.000 & 0.000 & 0.002 & 0.001 & 0.973 & 0.024 \\ 0.014 & 0.042 & 0.033 & 0.011 & 0.079 & 0.022 & 0.001 & 0.011 & 0.002 & 0.78 \end{pmatrix}$$

The initial distribution of migrant physicians in various countries is given by the components of the vector:

$$\pi'_0 = \{0,503; 0,123; 0,416; 0,395; 0,156; 0,096; 0,0173; 0,125; 0,0086; 0,255\}$$

and their distribution on four years (2014-2017), by using the Markov model allowed for forecasting the number of physicians that will emigrate to the countries taken into account (Figure 6).

Figure 6: Forecast about the evolution in the numbers of migrating physicians



Source: Own results

After the year 2009, the austerity measures for budgetary personnel (basic wage cuts by 25%, elimination of some bonuses, renouncing to pay supplementary work-hours, and limiting hiring according to the rate 1 vacancy for 7 layoffs) accelerated and diversified migration flows for physicians. The hospitals from abroad are more attractive, in these circumstances, due to the working conditions, the varied practice methods and patterns, and also wages that

are a couple of times higher than in Romania. The main destinations were maintained, in general, but the mobility of young graduates intensified who opt to undergo their resident training stage abroad and then get associated with circulatory migration.

This is the reason for which the parameters of the model change significantly. Additionally, the actual flows, according to the insufficient available data indicate an increase of the flows for specialised physicians and young residents on routes that are relatively new, respectively France, Germany, and Belgium. This requires adjustments in applying the model so as to fit the new developments on flows and intensities which would allow realising more relevant forecasts for the period 2014-2017.

Conclusions and discussions

The intensity and dimensions of health workers migration varies considerably from one country to another. According to the statistics in the field, some very developed countries rely on health workers from abroad with the purpose of covering the deficits in this sector of activity. This group of countries includes Belgium, Spain, Portugal Austria, Norway, Sweden, Ireland, Italy, Israel, and Great Britain, etc. Moreover, the process of migration/mobility for physicians (GP and specialised), dentists, certified nurses, other categories of staff continued to show relatively high shares even in the crisis period signalling on one hand the difficulties of medical systems from developed countries and acting as a forewarning for the retirement bulge of the years 2020.

The natural response of the respective health systems is to ensure the provision of adequate services and considering the shortages of nationals in the medical professions, to involve in active recruitment, translated into active migration of health workers from other countries, including non-European ones. On the other hand, developing countries – in particular those of Central and Eastern Europe – that have accessed the EU in the successive waves of 2004, and 2007 are sharing the concerns of an ageing population with the Old Member States. However, they have an added burden: labour migration in almost all sectors, which adds to the problems of an ageing population, and creates difficulties in most sectors of economic activity, and for which remittances of workers abroad are but a poor substitute for the considerable ‘brain drain’ in key professions that require highly-skilled personnel, like the health care sector.

The ‘value-chain’ of the medical care system should be better researched with respect to current and future institutional challenges, as some of the initiatives are at risk of being halted due to lack of, or overregulation in the field, and among the first issues to be approached should be the migration propensity.

The analyses performed by various international bodies have highlighted the hindrances in obtaining data regarding mobility/migration of health workers, from which we mention:

- The lack of a corresponding definition and common indicators regarding professional mobility;
- Difficulties in registering certain emerging types of mobility like, for instance, short-term mobility, work during weekends, periods of professional improvement/training abroad, etc.
- Difficulties in obtaining chronological series of data as result of changes in professional definitions, new methods for data gathering, etc.

The existing statistics about the migration of health workers highlight that in Europe the migration flows are predominantly one-directional from East to West. The lower income levels, the working and living conditions, but also the reforms which were not finalised in the

field of health in some of the new EU member-states are but few of the reasons that determine the direction and size of the migration flows.

The Markovian modelling methods can be used in forecasting the structure of migration flows for health workers from Romania, provided that a national databank is developed. Actually, measuring, analysing and forecasting labour force flows in the field of health from Romania should turn into a permanent, systematic concern, substantiated by statistical data first of all because of the severe negative effects triggered in the sector of healthcare services. The implications of this mobility and the flawed management of the allocation flows for staff on fields of specialisation leads to significant effects and which can be hardly compensated on medium- and long-term.

The flows of human resources in health can have multiple consequences, not only on the mix of health workforce consistence, but also on supplying healthcare services¹². From among the issues we mention but a few:

- health workforce gains and losses can either improve or weaken the performance of the health system and while they might seem negligible on short-term, significant effects might emerge on medium- to long-term;
- when dealing with exclusive and essential skills, even if a small number of specialised health workers migrate this can have negative effects on the performance of the health system;
- indirect effects on the health system can be generated also by medical personnel mobility from one region to another, as high numbers in one region could mean triggering or worsening the situation in the delivery of medical services in the region from where they left, the population suffering because of the lacking numbers of medical staff;
- moreover, health workers' (geographic and professional) mobility might lead sometimes to negative investment performance in the field. While health expenditure should be regarded as encouraging economic growth, there still remains the question of expenditures and investments if the trained individuals (either upper-secondary or tertiary level) choose to migrate sooner or later due to personal consideration, according to the documented push and pull factors.

In attempting to document relevant migration patterns a fine distinction could be operated, as follows: OECD countries, European countries – from the viewpoint of Europe as a region (thus, here including also Israel), and the EU-28. We consider that this distinction is important in terms of relevance and policies applicable in the field of health workers' migration.

Moreover, a set of complex indicators could be developed at EU-28 level based on these categories to better monitor the migration of health workers, and for delivering better policies in the field of health that would answer the needs of the medical workforce, while at the same time meeting also the requirements of the patients and the population at large with respect to the right and access to health and health-related services.

However, the concerns of the current states supplying the (highly) skilled and trained health workforce are scarce and insignificant when compared with the risks and considerable losses incurred both regarding human capital and financial investments. The skilled labour force migration especially in the field of health from Eastern Europe to Western Europe can be managed only by designing adequate policies, including investments in infrastructure, quality jobs, decent remuneration for experts and young graduates alike, and access to additional

¹² *Health Professional Mobility in the European Union Study*, HEALTH PROMETHEUS, [http://www.2020-horizon.com/HEALTH-PROMETHEUS-Health-professional-mobility-in-the-European-Union-study\(HEALTH-PROMETHEUS\)-s768.html](http://www.2020-horizon.com/HEALTH-PROMETHEUS-Health-professional-mobility-in-the-European-Union-study(HEALTH-PROMETHEUS)-s768.html) 2009 – 2011

financing resources for RDI in the medical field and international cooperation.

Even though Romania registered some developments in this respect, the dynamics of the reform in the health sector and the sector's modernisation are much too slow, the attractiveness for the young graduates for remaining and practicing in the country, even in the private system very low, and thus their mobility/migration will continue to be a relevant issue for dedicated policies. Additionally, the migration flows of health workers from the last years have augmented the negative economic and social impact on the health system and on the quality of the national healthcare services. Thus, at least for medium-term, by continuing the below par financing of the system, and limiting the employment rate based on unsubstantiated administrative criteria in the field of health, the chronic deficit of medical personnel will increase, and immigration will not be able to provide for compensation.

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