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What Can Be Learnt from the New Economics of Emigration of Medical Doctors to the European Union: The Cases of East and Central European, Middle Eastern and North African Economies?

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Abbreviations used:

AMGA: American Medical Group Association

AMO: Compulsory Medical Insurance, Morocco

ANAM: National Agency of Medical Insurance

BDS: Bachelor's in Medical Studies

BHPr: The Health Resources and Services Administration's Bureau of Health Professions

BMBS: bachelor of medicine and bachelor of surgery

CARIM: Consortium for Applied Research on International Migration

CHU: University Hospital Center, Morocco

CNOPS: National Fund for Social Welfare Works

CNSS: National Social Security Fund

COGME: Council on Graduate Medical Education

CRRA: constant relative risk aversion

ECE: Eastern & Central Europe

ECTS: European Credit Transfer System

EEA: European economic area

ENP: European Neighborhood Policy

EU: European Union

FMH: Federatio Medicorum Helveticorum

GATS: General Agreement on Trade in Services

GDP: Gross Domestic Product

GMC: General Medical Council

GMS: Graduates from medical schools

GP: General Practitioner

HDI: Human Development Index

HDR: Human Development Report

HE: Health expenditure

HOS: Heckscher Ohlin Samuelson

HRH: human resources for health

ILO: International Labour Organization

IMR: infant mortality rate

ISF: Improve sanitation facilities

MBBS: Bachelor of medicine & bachelor of surgery

MBD: Medical Brain Drain

MD: Doctor of Medicine

MDG: Millennium Development Goals

MENA: Middle East & North Africa

MIDA: Migration for Development in Africa

MIUR: ministry of education, universities and research

MNEMTSR: Ministry of National Education, Management Training and Scientific Research

MSAs: medical savings accounts

NBMA: National Board of Medico-legal Affairs

NGO: nongovernmental organizations

NHB: Number of Hospital Beds

NHS: National Health Service

NMD: Number of physicians migrating from MENA

OEC: Other European Countries

OECD: Organization for Economic Co-operation and Development

OMS: Organisation Mondiale de la Santé

ONE: Office National d'Electricité

ONEP: Office National d'Eau Potable, Morocco

PW: Wage of physicians

RAMED: Medical Assistance Regime, Morocco

R&D: Research and Development

RSPYMS: registered students per year in medical schools

SLE: School life expectancy

SNMSL: Syndicat National des Médecins du Secteur Libéral

TRIPS: Trade Related Aspects of Intellectual Property Rights

UAE: United Arab Emirates

UK: United Kingdom

UNESCO: United Nations Educational, Scientific and Cultural Organization

US: United States

USA: United State of America

WB: World Bank

WHO: World Health Organization

WTO: World Trade Organization

Policy Brief

What Can Be Learnt from the New Economics of Emigration of Medical Doctors to the European Union: The Cases of East and Central European, Middle Eastern and North African Economies?

The question tackled in this research report relates to how the new economics of migration of medical doctors from MENA and ECE countries to the EU can generate new economic policy options. As the current situation in both EU and sending economies appears to be restrictive, the new economics of skilled labor migration seems to provide new avenues that could generate economic policies within a more collaborative framework. The tools of the new economics of migration offer possibilities for reversing the brain-drain trend and producing win-win outcomes that are shared by sending and receiving countries. In this new framework, education and in this case, medical education and research can play the role of a ladder for the achievement of the expected win-win outcomes of the new collaborative policies. This is mainly because of the leveraging effects of skilled labor migration on the education system in the sending countries. These effects lead to generating nuanced outcomes in the brain drain and brain gain debates. Under the new economics of migration of qualified professionals, brain drain occurs only above a given threshold of emigration implying that sending countries can enjoyed brain gains. This approach is the one used in this research to identify further possible win-win outcomes between sending and destination countries, in the case of medical doctors. This study looks at different dimensions related to migration to EU of medical doctors from MENA and ECE economies. These dimensions include the assessment of deficits of medical doctors in relation to the needs of health care, the determination of the factors

and incentives underlying emigration to EU, besides the analysis of the overall global and bilateral contexts. It also addresses the framework that supports the attainment of the win-win outcomes.

The findings attained identify clearly the existence of shortages in medical doctors both in the North and South of the Mediterranean region. While some MENA countries hire medical doctors to cover their needs, others are suffering from losses of medical doctors. This situation does not differ from that occurring in Eastern and Central European economies despite the membership of some in the EU and the proximity of all to Europe. The findings show also that ECE share similar patterns with MENA economies and especially with North Africa and that their emigration patterns are under the same determinants. These include relative wages, medical education besides behavioral parameters. The study recognizes also that emigration to EU takes place even with the existence of restrictions related to the emigration of medical doctors from MENA and ECE economies.

But, promising avenues for the enforcement of further global cooperation are identified. They can benefit from the series of collaborative frameworks developed with the EU and within the Mediterranean context. These cooperative models are of bilateral and global types. These could lead to negotiations that can place emphasis on medical doctors and their North-South movements. This is also facilitated by the global trend in health care and in movements of medical doctors under globalization of health under the support of World Health Organization (WHO) and other international organizations. The other facilitating element relate to the promotion of trade in services where health care besides education are important components.

These results imply that medical education, as this is the area in the framework of the new economics of skilled labor migration that is the key factor in the mobility of medical doctors. The face of the coin is the medical research required to support higher medical education. Medical education and research are then considered to be the center of attraction of students but also of medical doctors from both North and South. The trained

medical doctors are then free to ensure permanent, temporal and circular migration depending on their perceptions of the opportunities offered in the North and South.

This framework is consistent with the global health systems that have been encouraged by international and regional organizations including World Health Organization (WHO). It is expected that under the processes of open mobility, strengthened North-South cooperation in medical research and education within the framework of globalized health systems, each economy can overcome shortages and can ensure the attainment of the millennium development goals. This is expected also to ensure continuous and updated health knowledge that can further be an important driver for this collaborative framework.

The findings of this research are submitted to a survey of around one hundred medical doctors operating in Morocco. These physicians recognize the relevance of the parameters that are behind the emigration decisions as suggested by the economic model developed in this research. They also confirmed the importance of medical research and education to promote the quantity and quality of medical doctors. The North-South framework of further cooperation in health through joint medical research and education is also identified to generate mutual benefits to both the European Union and its Mediterranean partners. The surveyed medical doctors recognize that these collaborative models exist but they are fragmented and scattered as they concern a limited number of medical schools and laboratories. They all call for a larger formalization and creation of a generalized framework linking North and South of the Mediterranean area.

Within this process, the implications of the new economics of skilled labor migration applied to medical doctors are identified to create win-win outcomes that support both production and diffusion of knowledge besides its implementation in health care. The economic and social policies needed at the national and global levels and generated by the new economics of migration are then identified to accelerate North-South cooperation.

Based on the analyzes and directions related to the new economics of mobility of medical doctors between the EU and the South Mediterranean countries, it appears that major suggestions can be made with recommendations to different parties and authorities involved. These suggestions concern all the parties related either to policy making in the health sector, in education, labor markets or in setting overall economic and social policies. The directions of recommendations address both EU, countries both in North and South but also International Organizations. The lines of the new strategies and economic policies can be underlined for EU and countries in the North, for countries in the South, for both but also for international organizations and NGOs. These are respectively as follows:

1. For EU and countries in the North: As there are opportunities of major win-win from the mobility of medical doctors, further cooperative frameworks with hospitals and universities in the South are to be strengthened. This is to be achieved through the creation of incentives for junior and senior medical doctors to join on short and medium terms, hospitals and medical schools in the South. This movement can also concern medical students at later stage of their medical training. Furthermore, useful frameworks can be ensured in the Northern economies and the level of EU to create formal conditions for training, medical research and professional acquisition to those coming from the South.
2. For countries in the South: The strengthening of the efforts in medical education and research through the development of further initiatives to support the engagement and exchange of students and medical doctors with the North. More details about enhancement of the medical training and research need to be developed. The capacity of medical schools requires also important increases such that more medical doctors can graduate with skills that are not different from those prevailing in the North. This facilitates the necessary harmonization in medical education and research.
3. Both North and South can engage in developing new niches for medical research and for the improvement of medical education through setting standards that

relate to quality research and education. Implementation plans need also to cover management of hospitals and private clinics.

4. International organizations such as WHO in collaboration with UNESCO and UNDP and with EU organizations are invited to contribute to the process of North-South Mediterranean collaboration. This is in fact along the line of the global health system promoted by WHO but also in conformity with the strategies pursued by UNESCO and UNDP (Millennium Development Goals). This can help promote the collaborative model in other regions of the world.
5. NGOs focusing on medical doctors either for promoting medical and education services or for ensuring partial of final returns of medical migrants can play an important role. The outputs from the new economics of migration of medical doctors can be the support to providing training and communication among professionals in both North and South.

Further details about this research can be found in the FEMISE report FEM 34-07, 2011 where researchers from Romania, Denmark and Morocco have collaborated to show the likely win-win gains to be achieved under the new economics of skilled labor migration. In this exercise descriptive as well as use of analytical models are applied to the available data on health, migration, medical education and labor markets. The current as well as previous situations are characterized. The major trends governing medical doctors are assessed besides a focus on future supplies and demands. The case of Morocco is selected to show current and prospective deficits in medical doctors. The major directions provided by the global health systems are discussed before introducing the new cooperative framework.

Executive Summary

The major objective of this research is to investigate how the new economics of skilled labor migration focusing on medical doctors can provide new economic and policy avenues that can strengthen the collaboration between Northern and Southern economies. Most of the attention is

devoted to the European countries with their links to ECE and MENA. The most important motivation of this investigation resides in finding out whether there are possible and feasible economic and social policies that can transform the brain-drain debate into win-win avenues of further collaboration. As the international set-up has already launched the global health system, new skilled labor migration policies as implied by the new economics of skilled labor as applied to medical doctors might generate new conditions for health gains in both Europe, ECE and MENA countries. This can be expanded to other world regions as promised by the global health system.

The realization of this objective is achieved through series of methods that emphasize both the description of past and current situations and the analysis of the determinants of migration. The description includes the use of the prevailing information on the supply, demand as well as in migration patterns. These descriptions are mainly based on the available reports, documents and publications. It also includes the mobilization of descriptive statistics to underline the patterns of the variables included.

This is followed by analysis of the determinants of emigration with the inclusion of economic, social and behavioral parameters. The economic models mobilized for this purpose are mainly based on frameworks accounting for schooling decisions and emigration as in Stark (2005) and Driouchi (2010). Both parts use available data gathered from international sources and from publications from OECD, WHO and ILO besides other sources mainly those available in different publications by F.Docquier, A.Marfouk and others.

The attained results show first that the new economics of skilled labor migration applied to the case of medical doctors has the potential of generating new avenues for economic, social and health policies. This is related to the role played by medical education and to the potential provided by medical collaborative education and research. Besides that, other important features are shown by the trends expressed at levels of countries and groups of countries. The EU, ECE and MENA show shortages in medical doctors in relation to the increasing needs in health. But, emigration of medical doctors from some MENA countries is faced with legal and professional constraints. Other MENA countries do satisfy their needs through direct hiring or bilateral arrangements with other countries. But, still, emigration is favored by both pull and push factors that include wages, markets and behavioral parameters. While salaries are major incentives, attitudes towards risk can be factors of determination in some countries, origin of emigration.

This may concern also EU countries with emigration occurring mainly with other developed economies within Europe but also with the USA and Australia, among others.
These results are again supported by other findings where the new economics of skilled labor migration allows for further possible collaborations between North and South. The global health framework that has been developing around the world is a model that supports further bilateral and multilateral cooperation. As medical education and research is at the heart of the new economic model, they can be used as means to enhance win-win collaboration where medical doctors can move from South to the North and from the North to the South. While the movement South-North is related to the brain-drain, the movement from North to South can be at the origin of brain-gain.

These results show that the policies that are brain-drain based can be transformed into policies that are supported by the freedom of movement and further collaboration to ensure medical education, research and provision of better health both in the North and South. The findings can further be developed to ensure implementation that could bring together more developing and developed countries to generate more health benefits. Given the role of education and research in the new economics of skilled labor migration, new avenues for the promotion of mobility for different categories of skilled labor (engineers, university professors besides other specialists) might be pursued through similar paths. The implementation of a framework based on the above results can be progressively developed and implemented through the on-going partnership between North and South Mediterranean countries. The EU and the WHO besides countries willing to engage in this process can play an important role in ensuring and showing success stories for other regions of the World. Issues related to financing, programming and detailed issues can be considered in relation to the above institutional framework.

The current report is composed of three parts that aim together at showing the new trends and the new policies necessary for the enhancement of health outcomes both in the North and South of the Mediterranean areas, through a win-win cooperative framework. Relevant country and regional policies appear to be possible under the global health system that is now in promotion at the regional and international levels. Given the links between emigration decisions of medical doctors and the domestic education system in countries of origin, the provision of medical education linking medical research and offering of courses, can also enhance the level of development of further cooperative ties between North and South. Incentives for the enhancement

of North-South migration of medical doctors can be easily promoted not just for the benefits of Southern countries but also of the more developed economies.

Part I is devoted to introducing the issue at hand with its different dimensions. It aims at showing how shortages in medical doctors are faced in MENA, ECE and EU.
The sub-part I.1focuses on the trends related to the shortcomings of medical doctors and to the continuous needs for the staffing of both public and private hospitals and health care facilities. It also provides the rationale for this study and the outlines retained and developed in this research. The sub-part I.2 is providing a descriptive study of the trends that characterize stocks and flows of medical doctors in MENA and ECE. It also introduces the major elements related to medical education and labor markets and incentives in these countries. The mobility of medical doctors from these countries is also addressed. The specifics of Europe with a focus on the EU are then discussed in I.3, through a descriptive approach where stocks and flows of medical doctors are analyzed. Incentives as well as constraints for immigration are then raised to show that the EU with its expansion provides room for new foreign doctors. This sub-part shows also that migration possibilities are also offered, with the development of medical education and new health systems in EU, ECE and MENA economies.
Part II introduces an analytical framework where the determinants of migration are assessed and tested using available data from ECE and MENA economies (II.1). This sub-part is also testing the validity of the new economics theoretical model of medical doctors'decisions on MENA and ECE countries. The factors underlying emigration are then revealed to include economic, market and behavioral parameters. These factors are definitely retained as motivating the emigration of medical doctors from ECE and MENA. A special focus is then placed on Morocco as one country of the MENA region (II.2). This sub-part has looked at the major trends and prospects characterizing the market supply and demand of medical doctors with focus on the prospects taking place in this economy. In such context a survey is conducted and its outcomes reported in II.3. Major consistencies are found between the findings from the application of the new economics theoretical model of migration of medical doctors besides the testing of the validity and expectations of the new collaborative North-South framework.

Part III focusing on further motivating the collaborative North-South framework is then introduced. The global health system as it has been developing during the last years is then introduced in III.1 to understand how this trend can be related to past and on-going mobility of medical doctors. This is followed by III.2 where the possibilities for a cooperative framework are

discussed both in theory and practice. This is a framework where directions for win-win benefits from the mobility of medical doctors are finally addressed.

The overall outcomes of this research are that, within the global health systems, it is possible to initiate further cooperative frameworks where countries and regions can accelerate collaborations. This type of collaboration is to be built around domestic medical education and health research systems. Specific and targeted policies could be initiated within the North-South dialogue. Incentives are to be developed such that medical doctors can be mobilized to join the South to contribute to the promotion of medical knowledge and practices in relation to the specificities of different countries. While medical doctors graduating from the South will have the options to stay or to migrate, junior medical doctors from the North can also have the means to enhance their knowledge and practice. This effort can also be joined by senior medical doctors as they are most of the time invited to participate in health and education projects related to the South. These new economic and social global, health and education policies are likely to transform the perception of brain-drain with its transformation to mutual brain-gains. The findings from this report are in phase with the 21st century approach to the governance of health as developed in "Governance for health in the 21st century: a study conducted for the WHO Regional Office for Europe" (2011). This latter report emphasizes series of pillars that include integration, participation of all with the inclusion and use of the necessary new knowledge. The cooperative framework suggested in this report is also tested in relation to the future of health prospects and trends in Morocco with coherent perceptions collected for local medical doctors. The case of Morocco appears to be representative of countries in North Africa where the suggested collaborative model can also be applied.

Résumé

La présente contribution est destinée à montrer la possibilité d'accélération de politiques économiques et sociales mais aussi d'éducation et de santé, visant la satisfaction des intérêts des pays du Nord et du Sud, d'abord de la Méditerranée. Ce travail concerne l'application de la nouvelle économie de la migration des compétences et notamment celle des médecins à la génération de nouvelles politiques économiques basées sur le principe du Win-Win. La littérature antérieure dominante avait souvent vu cette migration comme génératrice de pertes de ressources humaines au niveau des pays sources (Brain-Drain). La présente littérature a vu cette migration comme génératrice d'effets qui peuvent être bénéfiques aussi pour les pays d'origine. C'est à

travers cette dernière approche que ce travail est réalisé. Il a été centré essentiellement sur les pays du MENA et ceux de l'Europe de l'Est en relation aux économies de l'Union Européenne. Différentes dimensions liées à la migration des médecins et aux questions de la formation et de recherche en médecine ont été abordées.

Les résultats obtenus confirment la possibilité d'accélération de politiques économiques et sociales mais aussi d'éducation et de santé. Le système global de la santé ainsi que les modèles de coopération en vigueur permettent de créer de bonnes conditions pour la mise en œuvre de ces nouvelles politiques. La région de la Méditerranée peut présenter un nouveau modèle de coopération où les partenaires du Nord et du Sud acceptent et s'engagent dans des échanges de médecins. Ceux du Nord seraient incités par l'accumulation d'expériences en matière de participation à l'enseignement et à la recherche médicale, pendant que ceux du Sud peuvent s'engager dans les mêmes types d'activités dans le Nord. Ceci a crée un flux d'échanges de compétences sachant que tout le monde est gagnant. Les coopérations actuelles dans les domaines de santé, éducation et recherches peuvent ainsi être accélérées et renforcées. Ce modèle peut par la suite être repris par d'autres régions du monde et assurer ainsi la globalisation souhaitée par l'OMS, les Nations Unies ainsi que par beaucoup de pays. Le caractère de l'offre des services de santé comme biens publics internationaux est ainsi en mesure d'être assurée à travers ce modèle où tous les partenaires sont gagants, médecins inclus. Les résultats obtenus dans le présent rapport sont en cohérence avec les nouvelles modalités de gouvernance de la santé telles que suggérées dans le nouveau rapport de l'OMS: La « Gouvernance pour la santé au 21è siècle: Etude pour le Bureau de l'OMS-Europe » (2011). Parmi les piliers, il ya lieu de noter la participation de tous, plus d'inclusion des nouvelles technologies ainsi que l'intégration de tous les secteurs, preneurs de décision et aussi les représentations des patients. Le modèle de collaboration ainsi suggéré a été aussi testé par rapport aux perspectives et aux tendances du secteur de la santé au Maroc. Tous les éléments discutés à ce niveau, semblent présenter une cohérence satisfaisante y compris avec les points de vue des médecins opérant dans différents hopitaux au Maroc.

Part I: Introduction and Description of Migration of Medical Doctors from MENA & ECE countries to the EU

This first part is composed of three sub-parts devoted to show first the rationale, the objectives and the research dimensions pursued. The current and prospective situations in ECE and MENA countries as they related to medical doctors and their movements to the

EU are then described and discussed. Finally, the socio-economic and legal environments in the EU are introduced to show the levels of potential for immigration and the constraints related to the mobility of medical doctors from ECE and MENA.

I.1 Introduction to the Research

This is to introduce the main components of the overall study focusing on "What can be learnt from the new economics of the migration of medical doctors". The major directions expected focus on the new economic and social policies related to migration, employment and education besides country and global policies. These are discussed in relation to the outcomes of the new economics of skilled labor migration.

The objective pursued in this sub-part is to show how new economic policies are needed to support current and future health demand and requirements. While the literature on brain-drain has had pessimistic policy outcomes, the relatively new literature on brain-gain and brain-drain suggests new avenues for further and promsing policies. The global health systems as well as the specificities of health care require promising collaborative and mutual views between migrant receiving and sending countries.

Before introducing the key components of the proposal that is shown in I.1.2, the coverage of the situation prevailing around the world appears to constitute an important step. This is addressing the worldwide situation of shortage of medical doctors with its links to migration, policies and medical education. This latter contributes to the enhancement of the supply of physicians but might also be a source of emigration.

I.1.1 Shortage of Medical Doctors, Migration, Education & Global Health Systems

The above issues are discussed in this part with first, the introduction of shortage of medical doctors. This is followed by a focus on migration and then by the on-going related policies.

Such components are likely to allow for an overall understanding of the links between shortage, migration and education besides the overall policies governing education, migration and health.

I.1.1.1 Shortage of medical doctors

Shortages and imbalances of medical personal have been seen as an international problem (Mullan et al. 1995; Health Canada, (2005) and Miller et al. (1998). Zurn et al. (2002) suggest that economic theory considers that a skill imbalance occurs when the quantity of a given skill supplied by the work force and the quantity demanded diverge at the existing market conditions. These authors emphasize that labor market supplies and demands for occupational skills continuously fluctuate implying labor market imbalances or shortages.

In theory, all economies are facing shortages in medical doctors as these deficits relate not only to aggregated needs of growing populations, but also to the coverage of specific demands in well defined areas and in particular medical domains. Since shortage of medical doctors is universal, it is directly affecting the reforms aiming at making universal health care. The deficit of medical doctors is also affecting the universal insurance health care coverage. On the other hand, the boosting of universal health care and health insurance lead to further shortages in medical doctors. Smith (2008) among others, talks about global shortage in health care professionals and that Governments and health rights movements are both responsible of this global shortage. Other authors such as Mongkollporn et al. (2005) have been insisting on the unequal distribution of human resources of health that can generate abundance for some but shortage for others. The spatial distribution of medical doctors between regions in the same economy and between urban and rural areas can also show important deficits of medical doctors.

If health emergencies can be easily included in the identification of shortages, the needs of some specialties and the waiting time of patients are among the factors that can also express acute shortages in medical doctors. Seward (2007) has claimed that the waiting time for medical doctors can be more than seven weeks in the Boston area, in the USA. Other studies show that waiting can lead to the progression of diseases, which leads to further social and economic burdens. Abdullah (2005) investigates the possible operational problems that may lead to excessive waiting time for patients in Malaysia. He shows that 73.2% of the patients spend between 4 and 5 hours waiting to obtain a treatment from a doctor. He also demonstrates that this long time gives a negative perception on the quality of services in hospitals. Merritt Hawkins & Associates (2009) examine patients waiting times in fifteen states in the USA, with a focus on five medical

specialties. This study shows that waiting times differ depending on the medical specialty and also from one city to another. In addition, this study underlines that despite the high number of physicians per capita in the cities of USA; many of the patients experience very long waiting times. For instance, the average time in Philadelphia is 27 days and in Los Angeles is 24.2 days. Another contribution based on OECD countries suggests that while the waiting time is a serious health policy issue in Australia, Canada, Denmark, Finland, Ireland, Italy, Netherlands, New Zealand, Norway, Spain, Sweden, and United Kingdom, it is not that high in Austria, Belgium, France, Germany, Japan, Luxembourg, Switzerland, and the United States. The main reasons for this, reside registration time and the limited medical staff (Abdullah, 2005).

The growing progress and the new discoveries in health technologies are also likely to increase the demand for new medical areas implying an enhancement of the level of shortages. While all countries are concerned with these shortages, developing economies are likely to suffer the most from their implications relative to developed countries. These latter economies have better planning and management of their medical human resources in both public and private health sectors. The limited planning and management is itself among the sources of emigration of medical doctors from developing to developed economies even under a most pronounced shortage in the first types of economies. Besides that, developed economies do attract with their overall working and living conditions. But there are also differential incentives between developed countries. For Skinner (2002), the design of Medicare in Canada is considered as generating a monopoly provider of publicly-financed health insurance and as a coercive regulator of the health services industry. The author considers that this creates incentives to reduce labor wages in order to contain costs. The wage differentials between Canadian and American health professionals create a powerful incentive for Canadian medical personnel to immigrate to USA. To the above author, this is continuing to produce loss of medical doctors and nurses contributing thus to a labor shortage in the health care system and reductions in public access to health services that may be negatively affecting health outcomes in Canada.

In practice, each country has plans for its medical human resource needs and also programs for their fulfillment. But, these plans are contingent on risks and uncertainties

that take place locally and at the aggregate levels. Medical education is among the sources that are assumed to help cover these needs. But, risks related to emigration are likely to be limiting the realizations of these plans. At the same time, compensations of the eventual losses from emigration cannot prevail unless possibilities of attraction of immigrant medical doctors are embedded in the staffing plans, both at the public and private health sectors. This attraction can take place in developed countries and also under some co-operation and bilateral arrangements in some developing economies. Richer developing countries can proceed to covering their shortages through open, co-operative and direct hiring of medical doctors.

But, most developing countries may not be capable of offering the latter options. For these countries, emigration of medical doctors is synonymous to real shortages as increasing population health needs is not covered under a decrease of health staffing. Further shortages in medical doctors can be observed in these economies placing thus, more risks on the health of their populations.

The above descriptions and trends are supported through aggregate information about world shortages and density of medical doctors. The available data indicate that the shortage of medical doctors is present all over the world, but is critical in most developing countries and poorer regions such as in Sub-Saharan Africa and South Asia. It is also highly expected to be occurring in countries such as Morocco, Indonesia, Costa Rica, and Peru. Available data show overall high numbers of inhabitants per doctor. This is larger in some developing parts of the world. In sub-Saharan Africa, it can attain 50,000 inhabitans for one doctor.

Besides the above, shortage of medical doctors is more sensitive at the individual and aggregate levels as it affects human lives in comparison with deficits in other services that can either be compensated for, or have limited short run effects. This can be the case deficits in engineers and in teachers and faculty members but shortages in medical doctors are more critical to any economy. The emigration of medical doctors is consequently more critical than that affecting other types of skills.

While the development in international trade in services is promising as it can provide solutions to local and national deficits as it can cover series of domains that need expertise and access to skilled labor, the area of medical doctors can be hardly concerned

with this trade. Special arrangements and requirements are needed in this area even with the development of advanced technologies.

The shortages of medical doctors are certainly among the causes of mobility of health workforce and especially of medical doctors as there are countries that can offer better incentives and thus better conditions to reduce their deficits.

I.1.1.2 Migration of medical doctors

Migration of highly skilled labor is an area of interest to policy makers all over the world. Historical records show that this phenomenon represents the concern of many countries and is subject to different interpretations, disputes and expressions of fear (Bhorat et al., 2002). International migration among skilled workers shows a trend of noticeable growth in last decades: globalization, economic growth and the explosive growth in information and communication technologies are some of the reasons suggested by Bhorat et al. (2002). In addition, data from OECD (Organization For Economic Co-operation and Development) countries indicate that the medical doctors initially trained abroad make up a significant percentage of the medical core in these most of them: 21% in Australia, 23% in Canada and 9% in Finland as shown in Kumar and Simi (2007).

Data from the 2009 Human Development Report (HDR) illustrate international migrants' movements (UNDP, 2009). The figures show important intra-regional movements within Europe, Asia and Africa; whereas this movement is less important is the Americas and Australia. They also highlight important migrants outflow from countries with medium to low human development index toward countries exhibiting high human development index.

Incentives to immigrate differ from an individual to another. Some immigrate looking for better financial conditions; others seek higher standards of living, better education (visa and immigration services, 2011). These can be grouped into push and pull factors between the origin country and the country of destination. However, in the case of highly skilled labor, the salary gains are noticeable. Data from the HDR 2009 show the gaps in average professional salaries for selected country pairs for different specialties, namely engineers, physicians, nurses and professors. Physical doctors earn over 100 thousands US dollars in Canada per year compared to about 10 thousands per year in Zambia.

Immigrant doctors from Ivory Costs to France can have up to 60 thousands US dollars of annual salary gain.

Salary gains can be at the origin of remittances. In fact, as salary gains are considerable for skilled workers, part of the income tends to be expatriated to worker's home countries. In fact, data from the HDR, (UNDP, 2009) show the flows from international remittances in the years 2006-2007. The figures highlight the presence of intra-regional remittances especially at the level of Asia and Europe. In addition, remittances from North America totaled 30.1 billion US dollars toward Asia, 17.3 billion toward and 36.3 billion toward Latin and South America. Other income outflows happen between Europe, Africa and Asia. The 2002 World Bank report (WB) highlights that countries in MENA region are among the most important countries to receive remittances. However, it is argued in the literature that remittances from skilled labor are relatively smaller (Faini (2006); Siddiqui and Abrar (2003)). Skilled individuals are more likely to spend longer time periods in the host country and are more likely to bring their family members to the host country, as found in Faini (2006).

Therefore, salary gains and possibility for remittances among other incentives that encourages doctors and other health care professionals to emigrate from their home countries to other places. Ryan (2011) has looked into the different push and pull factors leading to the emigration of medical doctors. The push factors include low salaries, job conditions, risks, and limited implementation of human rights. For the pull factors, they include: economic reasons (better pay & improved socio-economic status), access to professional development opportunities & furthering of career, easy access to communication and technology, Promise of better education for children, Job Security, and aggressive recruitment by other countries.

Pull and the push dynamics between developed and developing countries have historically generated disparities between stocks and flows of health care professionals in and between these countries. In fact, Mejia and Pizurki (1976) in their WHO study looked at the global flows of physicians and nurses and showed increased disparities between developed and developing countries. The data show the total stock of physicians and nurses in both classes of countries while distinguishing the inflows and outflows. This study indicates that 89% of total inflows of health care professionals migrants are

into the developed countries; whereas, 56% of total outflows are from developing countries. In addition, between 1960 and 1970, about 16% out of the total stock of physicians were on the move, mostly migrating to the US and UK from countries like Ireland, India, Sri Lanka, the Philippine, Korea and Latin America.

Despite the important migration among health professionals around the world, the flows are far from being free. There are direct and indirect costs that immigrants face in the process of settling in their new destinations that can be considered as a barrier to migrate. In fact, Beine, Docquier, and Özden (2011) argue that migrants face significant legal barriers, social adjustment costs, financial burdens and many uncertainties while they are trying to live in their destination countries. The authors distinguished two main costs: Assimilation costs that include time and effort needed for the migrant to adjust to new social and cultural norms, in addition to the new linguistic and economic environment. "Policy" costs include all the legal entry barriers as well and the work requirements the migrant needs to deal with before arriving to destination (Beine, Docquier, and Özden, 2011). Some might argue that legal requirements might be less tough on skilled migrants, but they are still significant enough to hinder their free movement.

Even considering that immigration policies in receiving countries are tilted in favor of skilled migrants (Beine, Docquier, and Rapoport 2003) compared to non skilled, the legal and professional requirements of the medical profession can be real barriers for the medical doctors to exercise in a developed country. The entry restrictions are justified in order to assure the quality of professional services as argued by Garoupa (2006). In Germany for example, it is very difficult for a foreign doctor (from non EU countries) to get a work permission to work with a German heath institution. Foreign doctors need to have a residence permit, working permit, and the license to practice medicine. This license can only be given if the doctor/ applicant work with a preliminary permit between 12 and 18 months in a hospital. In addition, doctors have to demonstrate sufficient knowledge of German language (German Medical Association, 2011). Therefore, despite the promising incentives of migrating to Germany, doctors face legal and professional constraints that make it extremely difficult if not impossible to be a practitioner in developed countries.

Studies suggest that physicians move abroad for training purposes to seek out additional professional qualifications or to gain experience with innovative techniques in the medical field (Mejia and Pizurki, 1976). For Ryan (2011), medical doctors emigrate from developing countries to aquire skills that are available in more developed economies. According to this study, doctors initially leave as students, but after few years, they become established emigrants for different reasons. This creates a cycle where more skilled workers from the home country are disposed to join them (Ryan, 2011).

Trade in higher education services has known a considerable growth in volume and value (Bashir, 2007). This trade is taking two main forms: students moving to universities abroad and foreign universities are providing higher education partnership with local institutions, through in country presence or virtual presence, as presented by the author. Statistics by World Bank show that between 1999 and 2004, Sub-Saharan African countries showed a strong 77.8 percent increase, MENA and ECE states had increases of 57.9 and 58.3 percent respectively, while both North and Latin America had a 50 percent increase in students studying abroad (Bashir, 2007).

Trade in education services combined with higher incentives and work opportunities can push international students to become recognized emigrants. In the UK for example, doctors who came to attend postgraduate training make up 37.3% of all physicians in National Health Service (NHS) in the year 2000, as claimed by Foncier et al. (2004). Migrating while being a student in a medical school the elimination of the professional constraints foreign doctors are subject to in host countries.

The elements discussed above among others, provide evidence about medical doctor's emigration to different parts of the world. Following the increasing trend of this phenomenon, the concept of trade in health services emerged. In fact, Chanda (2004) pointed out that in OECD countries only, health care sector generates about 3 trillion US$ per year, and this amount is expected to raise in the following years as the demand for health care services increases (bureau of labor statistics, 2010). The economic globalization in addition to the revolution in information technologies have urged and encouraged international trade in health services.

Therefore, as any traded service, there are modes of service supply used in the estimation of trade in health services. Chanda (2004) have looked into these modes and summarized

them as follow: Cross-border delivery of health services (Mode1) concerns the shipment of laboratory samples, diagnosis, clinical consultations and second opinions via traditional mail channels and electronic ones. The author argues that tele-health services are popular among countries, for example, Indian doctors provide tele-pathology services to hospitals in Bangladesh and Nepal whereas some hospitals in the US provide tele diagnosis and consultation services to other hospitals in the Central America and Eastern Mediterranean (Chanda, 2004).

The second mode of interest to trade in health services is Medical tourism. This phenomenon occurs when people from developed nations travel to other countries around the world seeking medical treatments, due to the high costs of the same medical service in their own countries. Chanda (2004) argues that, in addition to the high costs of health care in countries like the US and UK, the convenience of international travel via air, the rapid advancement of medical technologies in lesser-developed nations all around the world, the exotic and the fun experience of traveling abroad have all contributed to the growth in medical tourism. Herrick (2007) pointed out the main destinations for tourists seeking health services. He claimed that most Americans look for treatment in Latin and South American countries, namely Mexico, Brazil and Argentina. India and Thailand are popular destinations for serious medical procedures as they benefit from high tech facilities. Other popular destinations especially for Europeans include ECE, Singapore, and South Africa.

Mode 4 concerns temporary movements of health care professionals. For Chanda (2004), this area of international trade is gaining importance in developing countries. This mode is about the outflow of qualified medical personnel from their home countries, usually seeking better living standards and carrier development opportunities in industrialized and rich countries. The author argues that this migration alleviate the shortage at the level of developed countries and benefits the source countries in terms of remittances. The movement is not limited to South/ North, but can occur within developed nations. For examples, given the shortage of medical doctors in Portugal and the high number of doctors in Spain, many Spanish doctors have moved to work in Portugal (Garoupa, 2006).

Facing migration and the global shortage in medical doctors, many countries have been reacting around the world to put in place global policies that will help promote health care through medical doctors.

I.1.1.3 Migration Policies

Literature suggests that migration is not a free process since it involves many direct costs, indirect costs, social and legal barriers that migrants are exposed to while settling in the new destination. As migration engages human capital, it is of a great concern to policy makers. High skilled emigration benefits from special attention as it is believed to be bringing gains to the destination country while having important direct and induced negative effects in the country of origin. Beine, Docquier, and Özden (2011) confirm that there is evidence of policy effect on migration; although this effect is larger for unskilled labor and those originating from low income countries, it is still significant for skilled individuals. Bhargava et al. (2001) argue that emigration of medical doctors deserves special attention from policy makers as it involves connections between population's health and economic growth especially at the level of developing countries.

In fact, Bhargava, Docquier and Moullan (2011) argue that the supply of medical doctors in developing countries is highly linked to the improvement of human development indicators. Stark and Fan (2001) found that when developing economies open up to migration of skilled workers, unemployment is exacerbated. Their study demonstrates that government policies with regard to employment affect policies to restrict or open up to skilled labor migration, medical doctors included. The reasons discussed above give strong arguments of the extent to which migration of medical doctors and critical and how it affects development, global heath, and unemployment. Policy makers around the world have raising concerns about this issue and strive to define a health system that alleviates the shortage while taking into consideration medical education as the supply mechanism of physicians. There is a prevalent need for alternative policies. Bourgain et al. (2008) consider that substitution policies are strategies sometimes chosen for curtailing the shortage of health professionals especially caused by the outflow of medical personnel.

In this regard, the EU is suggesting the new policy approach of "chosen migration". As the EU is experiencing a clear economic need for high skilled immigrants, its members are embracing policies to promote job dependent migration (Kahanec and Zimmermann, 2011). In other words, EU members are allowing labor market to select immigrants according to its needs. Those authors argue that the selection is based on skills or education while giving preferences to immigrants with university degree or professional qualifications. On the other hand, those policy projects are still in their infancy phase. In fact, there is still ambiguity about immigration policies and how they are handled between the different members of state. There is a lack of an effective and generalized immigration policy that allows for the alleviation of shortages and the mismatches between supply and demand of emigrants.

Therefore, in the case of medical doctors and taking into consideration the fact that shortages and migration seem to be irreversible facts; policymakers have to define an economic model that that will allow for a win-win situation between the parties involved. The model has to capture the different incentives at all levels and get to a kind of balance between developed countries willing to overcome shortages and developing countries seeking human development.

Bourgain et al. (2008) consider that substitution policies are strategies sometimes chosen for curtailing the shortage of health professionals especially caused by the outflow of medical personnel.

I.1.2 What can be learnt from the New Economics of Migration of Medical Doctors to the European Union: the case of ECE and MENA Economies

The ultimate objective of this research is to discuss possible economic policies that account simultaneously for the interests of the European Union (EU), the MENA and ECE economies as destination and source of emigration of medical doctors respectively. This discussion will be based on implications from sound economic models of the "new economics of skilled labor emigration". These models relate migration to education in the countries of origin among other variables and to the dynamics of labor markets in the destination countries. These models suggest that "brain drain" can be compensated for

by the enhancement of the level of the human capital in the countries of origin of emigration.

This research focuses on the migration of medical doctors from both MENA and ECE with EU countries as destinations. It aims at discussing the outcomes of this migration in relation to new economic and social policies that account for the interests of the destination and origin economies. Several publications have discussed the complex issue of emigration of medical doctors but results have so far been limited in their economic policy implications. Furthermore, the empirical side of these analyzes have sometimes overlooked the migration flows between the EU, the ECE and the MENA regions, especially that countries from the latter sets entertain a large array of institutional arrangements with EU.

The major factors related to the decisions of emigrant medical doctors can be methodologically captured using economic models of risk neutrality and aversion. Previous research has shown that the relative expected benefits from emigration as well as its rate have major effects on the net relative human medical capital that remains in the country of origin. Besides the yield of education, the effects of relative wages in the destination and sending countries are likely to change the emigration patterns. Comparisons of theoretical and observed relative human capital per country averages are to be conducted to test the statistical validity of the new economics implications of the model. The empirical analysis is to based on the available data by Docquier and Marfouk (2006 and 2008) and Bhargava, Docquier and Moullan (2010) besides other sources as provided by OECD (2010) and WHO (2010).

This enterprise will allow further use of theoretical and empirical models to understand the current trends of emigration of medical doctors on both the destination and origin countries. The Implications of this structure would infirm of confirm the previous findings in other countries that emphasize the importance of the magnitude of relative wages; the level of education and the attitude towards risk as likely determinants of the emigration of medical doctors.

I.1.2.1 Statement of the Research Issue

Given the importance of health care in promoting economic and social development mainly in the era where human development and Millennium Development Goals (MDG) are crucial, the needs for medical doctors and health workers, in general, are increasingly critical. This research is devoted to the analysis of the trends and determinants of the emigration of medical doctors from MENA and ECE to EU in relation to health care needs in both countries of origin and destination. This research accounts for the specificities of health care in these three regions and includes also the constraints faced by immigrant doctors in relation to medical practices in the EU. The respective roles of public, private and of professional medical organizations impose requirements to access medical jobs in the EU. These restrictions express the existence of specific interests at the level of different parties. For the medical migrants, this can affect their levels of incentives and decisions to emigrate.

The framework of the new economics of skilled labor migration is likely to strengthen the health, education and employment sectors without omitting global policies. The results of this approach are expected to generate win-win outcomes for all the players including the countries of destination and origin of medical migration. Reaching such win-win outcomes is indeed aligned with the growing concern of the EU as to the need to balance its needs with those of developing countries, source of emigration of medical doctors (The European Commission, 2008).

Further details about this research question are introduced below under the objectives of the research, the rationale, the research questions and the expected benefits from this investigation.

I.1.2.2 Objectives

As said earlier, the main objective of this research is to identify sound grounds for generating economic and social policies that are beneficial to all the parties concerned with the migration of medical doctors. The geographical focus includes MENA and ECE economies with their relations to the EU. For this purpose, series of sub-objectives are to be achieved mainly relation to the mobilization of the framework of the new economics of skilled labor migration. Such economic model has the benefits of accounting for health, education, employment and migration and preparing for the directions of new

sector and integrated policies that are useful to countries of origin but also of destination. The detailed objectives of the project are:

- Define a conceptual and consistent framework to analyze the trends and major determinants of the emigration of medical doctors from MENA and ECE to EU,
- Identify the health care needs in countries of origin and destination,
- Identify and examine the existent policies, incentives and the constraints to migrate and to practice in the destination countries,
- Highlight the similarities between MENA and ECE about the emigration of medical doctors,
- Develop an economic policy framework that would enhance the benefits of migration of medical doctors to all the parties involved.

I.1.2.3 Rationale

The empirical evidence accumulated on the existing interdependencies of health, education, economic and social development is suggesting that further attention needs to be paid to the provision of adequate health care (Driouchi et al, 2009 and Driouchi et al, 2010). However, major deficits in health care are observed in the MENA as well as in ECE countries. These two regions are sources of emigration of medical doctors to the EU.

Health care in the Arab countries, as described in the 2009 Arab Human Development Report, is considered as a major pillar of human security. From chapter 7 of the above report, it can be understood that even under the observed current progress, major deficiencies in health care are still on the rise. This same chapter (page 15) underlines the limitations of health professionals in these economies that exhibit a high rate of brain drain in health professionals and medical doctors.

Different contributions have also shown the extent of the emigration of medical doctors in relation to the health situation in the ECE region. The paper of Murdoch (2008) reports the existence of brain drain in Poland and focuses on the consequences of this outflow. Parker (2005) underlines the prevailing low wages in Hungary as accelerating the emigration of medical doctors but attracting replacement from Romania, Ukraine, and

Serbia. Low wages, poor working conditions and lack of resources and infrastructure besides the equivalence of diplomas were pointed out as the main reasons behind the willingness to emigrate from Romania to EU. In Estonia, the accession of the country to the EU in 2004 has led to a temporary migration peak of doctors and nurses to neighboring EU countries. Similar problems are encountered by the health sector in Latvia, as the initial shortage of medical staff has been exacerbated by the emigration of medical doctors to other EU. Every year approximately 300–400 physicians leave their jobs, while only 100 new physicians are hired, annually. France, Germany and the United Kingdom appear to be the major destinations from ECE countries.

Migratory flows of doctors from the MENA are not a recent phenomenon. It had started early in the 20th century and has fluctuated since then depending on the political and economic conditions between MENA and the main destination countries such as the United States, the United Kingdom, and France. Also, physicians' migration patterns have reflected, in general, the language and geographic proximity as well as the cultural and historical ties between destination and origin countries. For instance, while Middle Eastern and Egyptian physicians tend to concentrate their migration on the US and UK, North African physicians are more attracted by Francophone countries.

In the case of MENA, the first difficulty underlining the study of medical brain drain is the lack of official and clear statistics, especially on the side of the sending countries. The statistics produced by destination countries remain the sole origin of information on the topic, where the main source is the OECD (International Migration Outlook).

Overall, the MENA region is reported to have a high emigration rate. OECD statistics (2000) indicate that Lebanon has a high physicians' expatriation rate in the MENA region, followed by Morocco, Algeria, Iraq, Syria, and Egypt. The countries of the Golf (oil producing countries) generally display the lowest expatriation rates according to OECD data. Using total physician emigration rate in a country as the ratio between the stock of national physicians working abroad and the number of physicians trained in the home country, and excluding the doctors trained in the host country, Docquier and Bhargawa (2007) found that for 2009 Lebanon and Syria have the highest emigration rate with respectively 19.6% and 17.5% followed by Jordan (9.9%), Algeria (7.1%), Morocco (6.6%), and then Egypt (5.6%). Accounting for the physicians born in MENA but trained

abroad, Clemens and Patterson (2006) obtained higher estimates of 44% for Algerian physicians, 31% for Moroccans and 33% for Tunisians that are practicing abroad.

A report by the European commission (2010) points out that there is some evidence that the majority of the foreign-employed doctors and nurses are trained abroad and that their emigration is a symptom of the deficiency of the domestic health care system rather than a direct cause for the deficiency. Therefore, under the current conditions in the home countries, health care professionals have trouble entering the domestic healthcare system. Furthermore, the report explains that it is uncertain whether these doctors would have studied medicine anyway in the absence of a prospect to emigrate and in the absence of enough capacity in their original educational system.

This emigration has been viewed in the recent literature as involving "brain drain" and "brain gain" depending on the situation of countries that are sources of emigration. This research seeks to characterize the sending countries of MENA and ECE in relation to this new economics of skilled labor migration, in order to discuss the economic policy paths that are consistent with the current institutional arrangements developed with the EU.

I.1.2.4 Research Questions

Several relevant questions can be made explicit in relation to this research project. The most important questions to be addressed are:

- What are the major trends that have characterized health care and what are the likely needs of medical doctors in different countries composing the regions selected in this study?
- What are the major trends affecting the flows and stocks of medical doctors and what are the contributions of the medical training systems in different countries composing the above regions?
- What is the situation of emigration of medical doctors from the selected countries, and what are the recognized trends to be inferred from the available data?
- What are the determinants of emigration of medical doctors, based on the tradition of the new economics of skilled labor emigration?

- How does tertiary education with the training of medical doctors vary among the countries composing the selected regions to meet the needs of countries of destination in the EU?
- What are the current emigration, education, health and employment policies in the countries under study, and what improvements those are likely to favor better health care?
- How can emigration trends and related economic policies be compared amongst countries composing the selected regions?
- How can we account for the interests of all the parties involved to ensure possible win-win economic policies that can be strengthened in relation to the EU institutional arrangements?

I.1.2.5 Expected Knowledge Gains and Benefits from this research

The results to be attained will contribute to a better clarification and understanding of the emigration of medical doctors from these two regions that entertain direct and indirect economic, social and cultural relationships with the EU. The gains and benefits from this research can be expected to generate:

- A conceptual framework for analyzing the trends and major determinants of the emigration of medical doctors from MENA and ECE to EU,
- A set of instruments that are useful for integrating education, health care, employment and wages in the understanding of emigration patterns,
- Means for further integration of regional policies in MENA and ECE countries and regions,
- Stronger basis for economic and social policy coordination and negotiation between EU and the two regions analyzed.

Conclusion

This introduction shows that the needs for medical doctors have been increasing through time and countries. The implied shortages grow while accounting for new niches of health demand. This process has been leading to the acceleration of the migration of

physicians to economies where higher benefits and better working conditions are expected.

Developing countries appear to be mainly sources of this migration but developed economies have been also concerned. The overall picture that has been developed by different partners is that brain-drain in the consequence of the on-going trend of migration. This has had implications on both international and national debates and policies. Series of contributions in different social sciences have been developed around this approach.

But, the new economics of skilled labor migration has introduced more moderate view on the intensity of the brain-drain. This latter is conditional also on the gains that sources of migration can get through the effects on education. When looking at this process from the stand-point of health, medical education and research not only in the source but also in the destination, the question becomes promising to be a center of research. This concerns the likely economic and social policies that could be promoted when accounting for the new economics of skilled labor migration. The development of the global health system can help promote new win-win policies. These elements are submitted to the analysis with the focus of the EU-ECE and MENA contexts.

I.2 New Economics of Emigration of Medical Doctors to Europe: Characterization of Patterns, Determinants and Trends in MENA & ECE economies

To understand and assess the emigration of medical doctors from countries of the MENA and ECE to the EU, USA, Canada or Australia, it is necessary to initiate empirical investigations. The use of pre-established databases and various emigration-related variables and likely determinants is an important step towards this assessment. It is also established from previous studies such as in Driouchi et al. (2009) and Driouchi & Kadiri (2010) that new economics of emigration of skilled labor and of medical doctors can have promising effects not only for destination but also for source countries. Brain gains through the education systems are among the spillovers that can be shown in series of source countries. The cases of likely gains from MENA countries as established in

Driouchi & Kadiri (2010) are promising applications that show the limits of the previous brain drain theories and applications.

This sub-part aims at characterizing the emigration of medical doctors in the MENA and ECE countries. It attempts to identify and describe most of the variables and parameters that are considered and discussed in the following research developments. It starts with the methodological approach before tackling the description of the situation of medical doctors and their mobility to EU.

I.2.1: Methodological Approach

For the purpose of describing the main features related to the emigration of medical doctors from MENA and ECE countries to EU, four groups of countries are considered. There are (1) MENA countries excluding countries that are composed of a majority of emigrants (Algeria, Egypt, Iran, Iraq, Israel, Jordan, Lebanon, Libya, Morocco, Syria, Tunisia, Turkey and Yemen), (2) ECE (Belarus, Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, Slovenia and Ukraine), (3) other MENA countries (Bahrain, Kuwait, Saudi Arabia, Qatar, Oman and United Arab Emirates) and (4) Other European Countries/ OECD (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom).

Among the determinants considered in the following chapters and in the analytical studies introduced above, the pertinent variables include relative wages of medical doctors, labor markets, demographic trends, number of graduates, urban versus rural life, cost of medical education and other health degrees, characteristics of selection of medical students, number of registered medical students per year, economic growth and other related variables.

Databases were used to describe the emigration of physicians such as the one constructed by Docquier and Bhagrava (2006) or Bhagrava, Docquier and Marfouk (2010). The databases provide information about the population of the counties, the number of physicians practicing domestically, the number of physicians per 1000 people and the emigration rate of physicians that is derived from the stock of physicians abroad taken as a percentage of medical doctors trained in their country of origin. The data for this latter

is only available from 1991 to 2004 and it represents efforts of the Trade Team Development Research Group to measure the extent of brain drain in the international migration and development program. The main countries of destination for physicians coming from the MENA and other regions are the United Kingdom, USA, France, Canada, Germany, Belgium, Australia, Italy, Sweden, Switzerland and Austria.

In relation to relative wages, data are retrieved from the most recent International Labor Organization (ILO) Geneva (LABORSTA Labor Statistics Database) and completed with other sources as indicated in the reference list for France, Morocco and Tunisia. Since minimum and maximum salaries of French general physicians were not found in the ILO database, they were extracted from the Institut National de la Statistique et des Etudes Economiques (INSEE, 2002), the British Medical Journal (1997) and the French ministry of health statistics (2008). Tunisian and Moroccan physician wages were also retrieved from other sources as provided in the reference list. The data covers wages from 1995 to 2008 where only data for General physicians on a monthly basis were considered. The wages are then transformed to a common currency based on the exchange rate information provided by oanda.com currency converter. When different data points are available over several years, minimal and maximal figures are taken and relative wages are provided based on the wage of the country of origin divided by that of the destination country. Minimum and Maximum wages are then listed after converting all wages to Euro using update exchange rate information.

In order to describe the medical education systems of different sending and receiving countries from the groups studied in this chapter, data about each country's medical education system is needed. In this chapter, several sources were used including the European Medical Association, ranking websites of different medical schools, cost of living per country, tuition fees per school, number of schools and number of years of medical education. When many medical schools exist in a given country, a minimum and maximum tuition fees values are taken from the group of medical schools found in that country. The cost of living is based on the basic needs of students and it includes accommodation, food, utilities, gas, clothing and leisure. The figures are generally obtained in a monthly basis and are multiplied by ten to give an approximation of the

annual living costs per student. The Total fees listed in tables include annual tuition fees and annual cost of living per country.

The stock of health education graduates is used to assess the need and the flow of graduates between the four groups considered. The data was retrieved from the World Data Bank and it includes series of data from 1995 to 2009 per country.

I.2.2 Migration Flows of Medical Doctors & Availability at the Country Level

It is interesting to identify the rate of emigration to the MENA countries and all the other European countries that are not considered in Bhagrava, Docquier and Marfouk (2010) database. From this latter, the physician emigration rate (%) is identified from the stock of physicians abroad as percent of physicians trained in their country for the period 1998-2004. The total emigration rate including all destinations considered varies between 0.04% for Belarus in 1998 and 2000 and 28% for Iceland in 1998 (Table I.2.2.1).

Table I.2.2.1: Emigration rate of medical doctors (%)

Country	1998	1999	2000	2001	2002	2003	2004
Eastern European Countries							
Belarus	0.04	0.05	0.04	0.05	0.07	0.07	0.08
Bulgaria	2.02	2.14	2.31	2.43	2.61	2.95	3.11
Czech Republic	3.44	3.35	3.09	3.16	2.88	3.06	3.58
Estonia	3.00	2.83	2.71	2.71	2.71	2.74	3.00
Hungary	5.43	5.29	5.59	5.79	5.65	5.88	6.37
Latvia	1.30	1.29	1.32	1.49	1.57	1.64	1.90
Lithuania	0.79	0.91	0.97	1.02	1.17	1.34	1.61
Poland	4.18	4.28	4.47	4.59	4.56	4.87	5.46
Romania	4.95	5.00	5.14	5.42	5.76	6.16	6.47
Russia	0.26	0.29	0.30	0.33	0.35	0.38	0.39
Slovakia	5.14	4.01	4.03	4.06	3.26	3.66	3.87
Slovenia	1.76	1.82	1.82	1.83	1.88	2.10	2.12
Ukraine	0.91	0.97	1.06	1.12	1.21	1.35	1.46
Other European Countries							
Austria	4.71	5.00	5.05	5.11	5.54	6.03	6.07
Belgium	4.55	4.91	4.64	4.73	5.26	5.55	5.75
Denmark	5.26	5.04	4.86	4.73	4.33	4.17	4.22
Finland	5.36	5.43	5.59	5.59	5.71	5.83	5.81
France	2.09	2.11	2.11	2.14	2.19	2.21	2.25
Germany	3.09	3.14	3.15	2.88	3.20	3.27	3.44
Greece	5.72	5.54	5.65	5.66	5.85	6.23	6.50
Iceland	28.00	27.05	26.25	25.54	24.83	24.85	25.28
Ireland	25.41	24.53	24.56	22.73	22.44	22.45	22.37
Italy	2.37	1.67	1.66	1.66	2.30	2.37	2.40
Luxembourg	21.77	20.48	20.72	20.62	20.64	21.30	21.44
Netherlands	6.66	6.27	6.06	5.87	6.28	6.35	6.42

Norway	4.47	3.75	3.68	3.52	3.55	3.53	3.55
Portugal	2.14	2.15	2.13	2.16	2.21	2.26	2.31
Spain	4.08	3.93	3.69	3.94	4.12	4.29	4.29
Sweden	3.59	3.56	3.34	3.39	3.52	3.57	3.87
Switzerland	5.10	5.00	4.74	4.66	4.55	4.59	4.37
United Kingdom	9.97	9.41	9.36	9.33	9.05	9.20	9.25
MENA							
Algeria	1.75	2.34	2.89	3.44	3.97	4.14	4.23
Egypt	2.49	2.27	2.14	2.18	2.20	2.21	2.26
Iran	6.00	6.07	6.12	6.14	6.14	6.11	6.33
Iraq	9.43	10.13	10.68	11.36	11.98	12.04	12.43
Israel	5.06	4.91	5.10	5.09	5.22	5.38	5.61
Jordan	7.30	6.44	6.44	6.32	6.29	6.15	6.62
Lebanon	10.87	9.68	9.28	8.98	9.19	9.42	9.74
Libya	6.99	6.86	7.15	7.34	7.49	7.50	7.94
Morocco	6.48	6.62	6.73	6.62	6.79	6.84	7.02
Syria	8.75	9.51	9.46	9.65	9.82	9.94	10.48
Tunisia	4.15	4.22	4.23	4.30	4.38	4.42	4.53
Turkey	2.43	2.39	2.31	2.34	2.29	2.32	2.31
Yemen	1.87	1.95	1.91	1.79	1.79	1.81	1.94
Other MENA							
Bahrain	1.76	1.41	1.34	1.80	1.96	1.95	2.05
Kuwait	1.43	1.34	1.59	1.77	2.25	2.14	2.14
Oman	0.20	0.28	0.29	0.18	0.19	0.19	0.13
Qatar	4.78	4.11	3.07	2.78	2.77	2.77	2.82
Saudi Arabia	0.63	0.69	0.72	0.63	0.76	0.81	0.77
United Arab Emirates	4.07	3.94	3.76	3.78	3.96	4.04	4.49

Source: Docquier and Bhagrava (2006). The Medical Brain Drain Database.

To accompany the rate of emigration of physicians, the national availability of medical doctors is also identified. To reach this number, demographic variables are also needed such as the population per country and the number of physicians per 1000 people for each country[1]. The distribution of physicians per 1000 people is also an index for access to health care services and thus leads us to consider disparities between urban and rural areas in each country through the use of urban population per country.

Table I.2.2.2: Physicians (per 1,000 people)

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Eastern European Countries											
Belarus	4.43	4.55	4.58	4.50		4.55			4.78	4.87	
Bulgaria	3.45	3.46	3.40	3.38		3.56			3.66	3.67	
Czech Republic	3.00	3.10	3.40	3.40	3.50	3.50			3.58	3.61	
Estonia	3.11	3.21	4.48	3.16					3.33		
Hungary	3.10	3.10			3.20	3.20			3.04	2.78	
Latvia	3.06	3.18	3.20	2.91		3.01			3.14	3.04	

[1] The World Bank database: http://databank.worldbank.org/ddp/home.do

Lithuania	4.12	4.15	4.01	4.03		3.97			3.95	4.03	
Poland	2.30	2.30	2.20	2.30	2.30	2.50		1.97	2.01		
Romania	1.84	1.91	1.89	1.89		1.91			1.92		
Russia	4.21	4.19	4.21	4.17	4.00	4.25	4.00	4.00	4.31		
Slovakia			3.20	3.10	3.10	3.10	3.12				
Slovenia	2.18	2.14	2.17	2.19	2.25			2.40	2.42		
Ukraine	2.99	2.99	2.98	2.97		2.95			3.13		
Other European Countries											
Austria	3.10	3.10	3.20	3.30	3.30	3.40			3.66	3.79	
Belgium	3.70	3.80	3.90	3.90	3.90				4.23		
Denmark	2.80	2.80	2.80	2.80	2.90		3.59		3.16		
Finland	2.40	2.50	2.60	2.60	2.60	2.60			3.30	3.32	
France	3.30	3.30	3.30	3.30	3.30	3.40	3.37		3.41	3.74	
Germany	3.20	3.20	3.30	3.30	3.30	3.40			3.44	3.48	
Greece	4.10	4.20	4.30	4.40				5.00	5.35		
Iceland	3.30	3.40	3.40	3.50	3.60	3.60	3.62		3.77		
Ireland	2.20	2.30	2.20	2.40	2.40	2.60	2.79		2.94	3.08	
Italy	4.10	4.20	4.20	4.40	4.40	4.10	4.20		3.70		
Luxembourg	2.40	2.50	2.50	2.50	2.60	2.70	2.73	2.85			
Netherlands	2.90	3.10	3.20	3.30	3.10	3.10		3.71		3.92	
Norway	2.70	2.80	2.90	3.00	3.10	3.10			3.77	3.89	
Portugal	3.10	3.10	3.20	3.20	3.30	3.30		3.44			
Spain	2.80	2.90	3.20	3.10	2.90	3.30				3.76	
Sweden	3.00	3.00	3.10	3.20	3.30		3.28		3.58		
Switzerland	3.30	3.40	3.50	3.50	3.60				3.97		
United Kingdom	1.90	1.90	1.90	2.00	2.30	2.20					
MENA											
Algeria	1.00				1.13					1.21	
Egypt			2.12					2.43			
Iran	1.05							0.89			
Iraq	0.55			0.54			0.66	0.66		0.53	
Israel	3.78	3.92	3.77	3.91		3.82			3.67	3.63	
Jordan				2.05			2.03	2.36		2.56	
Lebanon				3.25				2.36	3.25		
Libya							1.25				
Morocco							0.51			0.56	
Syria	1.44	1.30		1.40					0.53		
Tunisia							1.34				
Turkey	1.20	1.20	1.30	1.30	1.40	1.40	1.30	1.30	1.56		1.45
Other MENA											
Bahrain				1.60			1.09	2.72		2.97	
Kuwait				1.53				1.80			
Oman	1.33				1.26		1.32	1.67		1.84	
Qatar				2.22				2.64	2.76		
Saudi Arabia				1.40			1.37			1.62	
United Arab Emirates				2.02	1.69			1.55			

Source: World data Bank, 2010

It appears from Table I.2.2.2 that Morocco has the lowest number of physicians per 1000 people of 0.51 in 2004 and Greece has the largest number or physicians per 1000 people of 5.35 in 2006. It is also observed that this variable is the lowest in the MENA region with the exceptions of Israel (3.92) and Lebanon (3.25) while it ranges between 1.84 and 4.87 in the ECE countries and it is at its highest in the other European countries. The total population per country (Table I.2.2.3) along with the number of physicians per 1000 people can provide the number of physicians per country (Table I.2.2.4).

Table I.2.2.3: Total Population per country (in Millions)

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Eastern European Countries												
Belarus	10.07	10.04	10.01	9.97	9.93	9.87	9.82	9.78	9.73	9.70	9.68	9.66
Bulgaria	8.26	8.21	8.06	7.91	7.87	7.82	7.78	7.74	7.70	7.66	7.62	7.59
Czech Republic	10.29	10.28	10.27	10.22	10.20	10.21	10.22	10.24	10.27	10.33	10.42	10.49
Estonia	1.39	1.38	1.37	1.36	1.36	1.35	1.35	1.35	1.34	1.34	1.34	1.34
Hungary	10.27	10.24	10.21	10.19	10.16	10.13	10.11	10.09	10.07	10.06	10.04	10.02
Latvia	2.41	2.39	2.37	2.36	2.34	2.33	2.31	2.30	2.29	2.28	2.27	2.26
Lithuania	3.56	3.53	3.50	3.48	3.47	3.45	3.44	3.41	3.39	3.38	3.36	3.34
Poland	38.67	38.66	38.45	38.25	38.23	38.20	38.18	38.17	38.14	38.12	38.13	38.15
Romania	22.50	22.46	22.44	22.13	21.80	21.74	21.68	21.63	21.59	21.55	21.51	21.48
Russia	146.90	146.31	146.30	145.95	145.30	144.60	143.85	143.15	142.50	142.10	141.95	141.85
Slovakia	5.39	5.40	5.39	5.38	5.38	5.38	5.38	5.39	5.39	5.40	5.41	5.42
Slovenia	1.98	1.99	1.99	1.99	1.99	2.00	2.00	2.00	2.01	2.02	2.02	2.04
Ukraine	50.14	49.67	49.18	48.68	48.20	47.81	47.45	47.11	46.79	46.51	46.26	46.01
Other European Countries												
Austria	7.98	8.00	8.01	8.04	8.08	8.12	8.17	8.23	8.28	8.30	8.34	8.36
Belgium	10.20	10.23	10.25	10.29	10.33	10.38	10.42	10.48	10.55	10.63	10.71	10.79
Denmark	5.30	5.32	5.34	5.36	5.37	5.39	5.40	5.42	5.44	5.46	5.49	5.53
Finland	5.15	5.17	5.18	5.19	5.20	5.21	5.23	5.25	5.27	5.29	5.31	5.34
France	58.40	58.62	58.90	59.19	59.60	60.15	60.52	60.87	61.35	61.94	62.28	62.62
Germany	82.05	82.09	82.21	82.33	82.51	82.54	82.52	82.47	82.38	82.27	82.11	81.88
Greece	10.84	10.88	10.92	10.95	10.99	11.02	11.06	11.10	11.15	11.19	11.24	11.28
Iceland	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.31	0.32	0.32
Ireland	3.71	3.76	3.81	3.87	3.93	4.00	4.07	4.16	4.26	4.36	4.43	4.45
Italy	56.91	56.92	56.95	56.98	57.16	57.60	58.18	58.61	58.94	59.38	59.83	60.22
Luxembourg	0.42	0.43	0.44	0.44	0.45	0.45	0.46	0.47	0.47	0.48	0.49	0.50
Netherlands	15.70	15.81	15.93	16.05	16.15	16.23	16.28	16.32	16.35	16.38	16.45	16.53
Norway	4.43	4.46	4.49	4.51	4.54	4.56	4.59	4.62	4.66	4.71	4.77	4.83
Portugal	10.13	10.17	10.23	10.29	10.37	10.44	10.50	10.55	10.58	10.61	10.62	10.63
Spain	39.72	39.93	40.26	40.72	41.31	42.00	42.69	43.40	44.12	44.88	45.56	45.96
Sweden	8.85	8.86	8.87	8.89	8.92	8.96	8.99	9.02	9.08	9.15	9.22	9.30
Switzerland	7.11	7.14	7.18	7.23	7.28	7.34	7.39	7.44	7.48	7.55	7.65	7.73
UK	58.49	58.68	58.89	59.11	59.33	59.57	59.88	60.23	60.60	60.98	61.41	61.84
MENA												
Algeria	29.65	30.07	30.51	30.95	31.41	31.89	32.37	32.85	33.35	33.86	34.37	34.90

Egypt	67.57	68.86	70.17	71.52	72.89	74.30	75.72	77.15	78.60	80.06	81.53	83.00
Iran	61.85	62.90	63.94	64.98	66.01	67.04	68.07	69.09	70.10	71.02	71.96	72.90
Iraq	23.64	24.36	25.11	25.75	26.41	27.08	27.77	28.48	29.20	29.95	30.71	31.49
Israel	5.97	6.13	6.29	6.44	6.57	6.69	6.81	6.93	7.05	7.18	7.31	7.44
Jordan	4.60	4.68	4.80	4.92	5.04	5.16	5.29	5.41	5.54	5.68	5.81	5.95
Lebanon	3.67	3.72	3.77	3.83	3.90	3.97	4.03	4.08	4.13	4.16	4.19	4.22
Libya	5.13	5.24	5.35	5.46	5.57	5.68	5.80	5.92	6.05	6.17	6.29	6.42
Morocco	28.11	28.47	28.83	29.17	29.50	29.82	30.15	30.49	30.85	31.22	31.61	31.99
Syria	15.70	16.09	16.51	16.96	17.44	17.95	18.51	19.12	19.60	20.08	20.58	21.09
Tunisia	9.33	9.46	9.56	9.67	9.78	9.84	9.93	10.03	10.13	10.23	10.33	10.43
Turkey	64.40	65.44	66.46	67.44	68.40	69.33	70.25	71.17	72.09	73.00	73.91	74.82
Yemen	17.15	17.66	18.18	18.72	19.28	19.84	20.43	21.02	21.64	22.27	22.92	23.58
Other MENA												
Bahrain	0.62	0.64	0.65	0.66	0.68	0.70	0.71	0.73	0.74	0.76	0.78	0.79
Kuwait	2.03	2.11	2.19	2.28	2.33	2.40	2.46	2.54	2.60	2.66	2.73	2.79
Oman	2.32	2.36	2.40	2.44	2.48	2.53	2.57	2.62	2.67	2.73	2.79	2.85
Qatar	0.57	0.59	0.62	0.65	0.68	0.73	0.80	0.89	1.00	1.14	1.28	1.41
Saudi Arabia	19.70	20.20	20.64	21.10	21.57	22.04	22.53	23.12	23.68	24.24	24.81	25.39
UAE	2.90	3.07	3.24	3.41	3.59	3.77	3.93	4.09	4.23	4.36	4.48	4.60

Source: World Data Bank (2010)

The number of physicians per country is extracted from Bhagrava, Docquier & Marfouk (2010) and it considers the period 1998-2004 (Table I.2.2.4)

Table I.2.2.4: Number of physicians per country

Country	1998	1999	2000	2001	2002	2003	2004
Eastern European Countries							
Belarus	44618	45674	45817	44831	44628	44430	44430
Bulgaria	28477	28420	27395	26771	26632	26477	26477
Czech Republic	30885	31653	34929	35109	35704	35707	35707
Estonia	4311	4411	4422	4311	4292	4276	4276
Hungary	31353	31806	30072	29542	31493	31397	31397
Latvia	7378	7594	7599	6875	6814	6764	6764
Lithuania	14646	14657	14056	14021	13969	13909	13909
Poland	88932	87471	84979	84152	87934	87851	87851
Romania	41311	42871	42388	41764	41143	41032	41032
Russia	618298	613664	613180	603843	601001	598307	598307
Slovakia	13477	17405	17454	17506	19364	19404	19404
Slovenia	4318	4240	4316	4370	4375	4377	4377
Ukraine	150411	149008	147400	145996	144879	143804	143804
Other European Countries							
Austria	23931	23976	24837	26047	26618	26697	26697
Belgium	40268	38859	42042	43037	40299	40466	40466
Denmark	17803	18090	18156	18221	19684	19731	19731
Finland	15459	15791	15890	16111	16117	16157	16157
France	192713	191791	194347	194771	196301	197215	197215
Germany	262550	263017	271293	297835	272276	272385	272385
Greece	46591	47885	47121	48211	48392	48515	48515
Iceland	904	931	964	990	1037	1040	1040

Ireland	8167	8444	8424	9165	9432	9586	9586
Italy	236111	339946	346640	349977	253837	253644	253644
Luxembourg	1024	1085	1095	1119	1153	1165	1165
Netherlands	45524	48963	50941	52788	50046	50288	50288
Norway	11966	14694	15242	16047	16136	16221	16221
Portugal	31400	32325	33197	32947	33178	33421	33421
Spain	115574	120192	129493	122202	118660	119194	119194
Sweden	24785	25431	27017	27094	27185	27282	27282
Switzerland	23463	23919	25242	25309	26244	26460	26460
United Kingdom	111331	117465	117760	118100	124381	124591	124591
MENA							
Algeria	29507	29950	30385	30835	31320	31833	31833
Egypt	110844	125540	135491	138034	140564	143079	143079
Iran	64893	65822	66796	67702	68764	69658	69658
Iraq	12280	12538	12773	12858	13125	13410	13410
Israel	22542	23976	23688	25178	25675	26152	26152
Jordan	8275	9480	9774	10312	10600	10880	10880
Lebanon	10526	11959	12984	14261	14445	14628	14628
Libya	6499	6626	6756	6890	7028	7171	7171
Morocco	12777	12989	13204	14093	14320	14548	14548
Syria	22179	20530	21855	23209	23780	24338	24338
Tunisia	6533	6619	6694	6772	6847	6927	6927
Turkey	78188	80817	84044	85040	90514	91926	91926
Yemen	3308	3403	3501	3946	4067	4192	4192
Other MENA							
Bahrain	772	853	1005	1091	1114	1136	1136
Kuwait	3446	3582	3504	3470	3561	3655	3655
Oman	3062	3123	3205	3296	3189	3266	3266
Qatar	710	848	1170	1323	1352	1381	1381
Saudi Arabia	29528	30297	29012	29739	30578	31476	31476
United Arab Emirates	5385	6066	6494	7058	7597	8177	8177

Source: Docquier & Bhagrava (2006). The Medical Brain Drain Database

I.2.3 Relative Wages of Medical Doctors across Countries

Many developing countries suffer from shortages in health care personnel. This is largely responsible for the quality of and the effective access to health care. Concerning medical doctors, the trends related to their migration are described as both internal and external to the medical practice in the country. The basic risk is to loose the personnel motivation especially physicians who are important components of the patients-health systems relationship. The internal movement of physicians takes place from rural and underdeveloped regions to urban and developed regions of a specific country. It is also

observed externally from developing to developed countries or between continents. Movements between developed economies are also observed.

Tefera (2008) found that the internal migration in Ethiopia, meaning from the public to the private health care sector, is due to low salaries, lack of medicine and drugs, poor quality of management and lack of professional resources. The author found that the causes of emigration outside Ethiopia are again low salaries and poor quality of management, in addition to lack of incentives, de-motivation by health care infrastructure, facilities and resources, low quality of life and political unrest. The most attracting factors for Ethiopian physicians to move externally were found to be the quality of education, better opportunities, superior health facilities, infrastructure and resources, better life quality and political stability (Tefera, 2008).

Thus, the most important cause of emigration of medical doctors is clearly to get better wages (WHO, 2006). For this reason, a comparison between sending and receiving countries wages can help establish the weight of this factor through relative wages.

Table I.2.3.1: Minimum and maximum relative wages (from MENA to OECD)

Relative Wages: MIN

Other EU/ MENA	Algeria	Egypt	Jordan	Morocco	Tunisia	Turkey	Yemen
Austria	0.04	0.01	0.18	0.14	0.18	0.45	0.02
Denmark	0.01	0.00	0.04	0.03	0.04	0.11	0.00
Finland	0.03	0.01	0.13	0.10	0.13	0.33	0.02
France	0.04	0.01	0.19	0.15	0.19	0.48	0.02
Germany	0.03	0.01	0.13	0.10	0.13	0.31	0.01
Italy	0.03	0.01	0.13	0.10	0.13	0.33	0.02
Luxembourg	0.02	0.01	0.12	0.09	0.12	0.29	0.01
Norway	0.02	0.00	0.07	0.06	0.07	0.18	0.01
Portugal	0.07	0.02	0.31	0.24	0.31	0.77	0.04
United Kingdom	0.02	0.01	0.11	0.08	0.11	0.26	0.01

Relative Wages: MAX

Other EU/ MENA	Algeria	Egypt	Jordan	Morocco	Tunisia	Turkey	Yemen
Austria	0.09	0.02	0.26	0.25	0.20	0.45	0.02
Denmark	0.02	0.00	0.06	0.05	0.04	0.10	0.00
Finland	0.05	0.01	0.15	0.14	0.11	0.25	0.01
France	0.05	0.01	0.14	0.14	0.11	0.25	0.01
Germany	0.03	0.01	0.09	0.09	0.07	0.16	0.01
Italy	0.06	0.01	0.16	0.16	0.13	0.29	0.01
Luxembourg	0.06	0.01	0.16	0.16	0.13	0.29	0.01
Norway	0.04	0.01	0.10	0.10	0.08	0.18	0.01
Portugal	0.11	0.02	0.30	0.30	0.23	0.53	0.02
United Kingdom	0.05	0.01	0.14	0.14	0.11	0.25	0.01

Sources: International Labor Organization (ILO) Geneva (Laborsta Labor Statistics Database); Institut National de la Statistique et des Etudes Economiques (INSEE, 2002); The British Medical Journal (1997) and The French Ministry of Health Statistics (2008).

Since there are four groups of countries then six combinations of sending/ host countries are found. Tables I.2.3.1 to I.2.3.5 show the relative minimum and maximum wages of physician emigrants between the sending and receiving countries.

Table I.2.3.1 compares wages between MENA as sending countries and other European countries as hosts. It is observed, in this case, that sending MENA countries have much lower wages than the available other European countries especially for Algeria, Egypt and Yemen. Turkey, Jordan, Morocco and Tunisia do have lower wages compared to the other European countries considered but in a less dramatic way.

The following table describes relative wages between ECE countries and the other European countries (Table I.2.3.2). The comparison shows that some countries have very low wages compared to the other European countries such as Ukraine, Russia, Bulgaria, Romania, Estonia, Hungary and Belarus. The others (Czech Republic, Latvia, Poland, Slovakia and Slovenia) have higher ratios but still have low wages.

Table I.2.3.2: Minimum and maximum relative wages (ECE sending to OEC)

Relative Wages : MIN

Other EU / Eastern EC	Belarus	Bulgaria	Czech Republic	Estonia	Hungary	Latvia	Lithuania	Poland	Romania	Russia	Slovakia	Slovenia	Ukraine
Austria	0.01	0.11	0.23	0.09	0.06	0.37	0.11	0.26	0.01	0.01	0.27	0.31	0.02
Denmark	0.00	0.03	0.06	0.02	0.01	0.09	0.03	0.06	0.00	0.00	0.06	0.07	0.00
Finland	0.00	0.08	0.17	0.07	0.04	0.27	0.08	0.19	0.00	0.01	0.20	0.22	0.01
France	0.01	0.12	0.25	0.10	0.06	0.40	0.12	0.28	0.01	0.01	0.29	0.33	0.02
Germany	0.00	0.07	0.16	0.06	0.04	0.26	0.08	0.18	0.00	0.01	0.19	0.21	0.01
Italy	0.00	0.08	0.17	0.07	0.04	0.28	0.08	0.19	0.00	0.01	0.20	0.23	0.01
Luxembourg	0.00	0.07	0.15	0.06	0.04	0.24	0.07	0.17	0.00	0.01	0.17	0.20	0.01
Norway	0.00	0.04	0.09	0.04	0.02	0.15	0.05	0.11	0.00	0.00	0.11	0.12	0.01
Portugal	0.01	0.19	0.41	0.16	0.10	0.65	0.19	0.45	0.01	0.02	0.47	0.53	0.03
UK	0.00	0.06	0.14	0.05	0.03	0.22	0.07	0.15	0.00	0.01	0.16	0.18	0.01

Relative Wages : MAX

Other EU / Eastern EC	Belarus	Bulgaria	Czech Republic	Estonia	Hungary	Latvia	Lithuania	Poland	Romania	Russia	Slovakia	Slovenia	Ukraine
Austria	0.18	0.11	0.46	0.14	0.32	0.37	0.27	0.34	0.30	0.07	0.28	0.45	0.02
Denmark	0.04	0.02	0.10	0.03	0.07	0.08	0.06	0.07	0.06	0.02	0.06	0.09	0.00
Finland	0.10	0.06	0.26	0.08	0.18	0.21	0.15	0.19	0.17	0.04	0.16	0.25	0.01
France	0.10	0.06	0.26	0.08	0.18	0.21	0.15	0.19	0.17	0.04	0.16	0.25	0.01
Germany	0.07	0.04	0.17	0.05	0.12	0.14	0.10	0.12	0.11	0.03	0.10	0.16	0.01
Italy	0.12	0.07	0.29	0.09	0.21	0.24	0.17	0.21	0.19	0.05	0.18	0.28	0.01
Luxembourg	0.12	0.07	0.29	0.09	0.21	0.24	0.17	0.21	0.19	0.05	0.18	0.28	0.01
Norway	0.07	0.04	0.18	0.05	0.13	0.15	0.11	0.13	0.12	0.03	0.11	0.18	0.01
Portugal	0.22	0.13	0.54	0.16	0.38	0.44	0.31	0.40	0.35	0.09	0.33	0.53	0.02
UK	0.10	0.06	0.26	0.08	0.18	0.21	0.15	0.19	0.17	0.04	0.16	0.25	0.01

Sources: ILO (2011); INSEE (2002); BMJ (1997) and French Ministry of Health Statistics (2008).

By comparing wages of MENA countries and the ECE ones, it is again observed that Egypt, Yemen and Algeria do have the lowest minimal wages relative to the majority of the ECE countries available for this study (Table I.2.3.3). However, Belarus, Romania, Russia and to a certain extent Ukraine do have lower minimal wages than the lowest physician income countries of the MENA.

Table I.2.3.3: Minimum and maximum relative wages between MENA and ECE

Relative Wages : MIN

MENA / ECE	Belarus	Bulgaria	Czech Republic	Estonia	Hungary	Latvia	Lithuania	Poland	Romania	Russia	Slovakia	Slovenia	Ukraine
Algeria	0.14	2.76	6.04	2.33	1.50	9.65	2.89	6.71	0.13	0.25	6.98	7.90	0.41
Egypt	0.53	10.66	23.31	8.99	5.80	37.24	11.15	25.90	0.51	0.97	26.93	30.48	1.57
Jordan	0.03	0.59	1.30	0.50	0.32	2.07	0.62	1.44	0.03	0.05	1.50	1.70	0.09
Morocco	0.04	0.77	1.68	0.65	0.42	2.68	0.80	1.86	0.04	0.07	1.94	2.19	0.11
Tunisia	0.03	0.59	1.30	0.50	0.32	2.07	0.62	1.44	0.03	0.05	1.50	1.70	0.09
Turkey	0.01	0.24	0.52	0.20	0.13	0.84	0.25	0.58	0.01	0.02	0.61	0.69	0.04
Yemen	0.25	5.09	11.14	4.29	2.77	17.80	5.33	12.37	0.24	0.47	12.87	14.56	0.75

Relative Wages : MAX

MENA / ECE	Belarus	Bulgaria	Czech Republic	Estonia	Hungary	Latvia	Lithuania	Poland	Romania	Russia	Slovakia	Slovenia	Ukraine
Algeria	1.97	1.15	4.92	1.47	3.46	4.01	2.84	3.59	3.17	0.77	3.03	4.76	0.21
Egypt	11.08	6.46	27.74	8.31	19.46	22.57	15.99	20.24	17.85	4.34	17.05	26.83	1.18
Jordan	0.71	0.42	1.78	0.53	1.25	1.45	1.03	1.30	1.15	0.28	1.10	1.73	0.08
Morocco	0.73	0.42	1.82	0.54	1.28	1.48	1.05	1.33	1.17	0.28	1.12	1.76	0.08
Tunisia	0.94	0.55	2.35	0.70	1.65	1.91	1.35	1.71	1.51	0.37	1.44	2.27	0.10
Turkey	0.41	0.24	1.03	0.31	0.72	0.84	0.59	0.75	0.66	0.16	0.63	1.00	0.04
Yemen	8.74	5.09	21.87	6.55	15.35	17.80	12.61	15.96	14.08	3.43	13.45	21.15	0.93

Sources: ILO (2011); http://medecinsmaroc.xooit.com/t805-a-propos-du-salaire.htm; http://www.djazairess.com/fr/lexpression/80470; http://www.djazairess.com/fr/lexpression/80470;http://www.businessnews.com.tn/details_article.php?t=519&a=19911&temp=1&lang=&w=; http://webcache.googleusercontent.com/search?q=cache:http://www.maroc-hebdo.press.ma/MHinternet/Archives264/html_264/Article4.html&hl=fr&strip=1; http://www.yabiladi.com/forum/salaire-medecin-avocat-dentiste-maroc-1-1913927-1914738-quote=1.html#REPLY

When considering maximal wages, it appears that Egypt has the lowest salaries compared with the available ECE countries.

Table I.2.3.4: Minimum and maximum relative wages between other MENA and the other European countries (OEC)

	Relative Wages			
	MIN		MAX	
Other EU/ Other MENA	**Bahrain**	**Kuwait**	**Bahrain**	**Kuwait**
Austria	0.49	0.67	0.62	0.67
Denmark	0.12	0.16	0.13	0.14
Finland	0.36	0.49	0.35	0.38
France	0.52	0.72	0.34	0.38
Germany	0.34	0.47	0.22	0.25
Italy	0.36	0.49	0.39	0.43
Luxembourg	0.31	0.43	0.39	0.43
Norway	0.20	0.27	0.24	0.27
Portugal	0.84	1.16	0.73	0.80

United Kingdom	0.29	0.40	0.35	0.38

Sources: ILO (2011); INSEE (2002); BMJ (1997) and French Ministry of Health Statistics (2008).

The same situation exists for Yemen but it has slightly higher maximal wages than Ukraine while Algeria has higher wages than Ukraine and slightly higher maximal wages than Russia. Table I.2.3.4 shows that physicians' wages in Bahrain and Kuwait are lower than the other European countries but they are not much lower than Austria and Portugal.

The following Table I.2.3.5 describes the relative wages between Bahrain and Kuwait as other MENA countries and the available ECE countries. It is observed that all the ECE countries have lower wages than both countries. In the case of Belarus, Ukraine, Romania and Russia, minimal wages are much lower than Bahrain and Kuwait.

Table I.2.3.5: Minimum and maximum relative wages (Other MENA and ECE)

Relative Wages : MIN

Other MENA / ECE	Belarus	Bulgaria	Czech Republic	Estonia	Hungary	Latvia	Lithuania	Poland	Romania	Russia	Slovakia	Slovenia	Ukraine
Bahrain	0.01	0.22	0.48	0.19	0.12	0.77	0.23	0.53	0.01	0.02	0.56	0.63	0.03
Kuwait	0.01	0.16	0.35	0.13	0.09	0.56	0.17	0.39	0.01	0.01	0.40	0.46	0.02

Relative Wages : MAX

Other MENA/ ECE	Belarus	Bulgaria	Czech Republic	Estonia	Hungary	Latvia	Lithuania	Poland	Romania	Russia	Slovakia	Slovenia	Ukraine
Bahrain	0.30	0.17	0.75	0.22	0.53	0.61	0.43	0.55	0.48	0.12	0.46	0.72	0.03
Kuwait	0.27	0.16	0.68	0.20	0.48	0.56	0.39	0.50	0.44	0.11	0.42	0.66	0.03

Sources: ILO (2011); INSEE (2002); BMJ (1997) and French Ministry of Health Statistics (2008).

These comparisons lead to the identification of the three major trends among the four groups of countries. It is logical to conclude some hypotheses considering that (1) physicians with origins from all MENA countries move to practice in the other European countries, (2) ECE' physicians emigrate to other European countries and (3) to all MENA countries except Egypt, Yemen and Algeria.

Malik et al. (2010) found that there are socio-cultural and organizational motivators that lead to external migration from Pakistan such as poor working conditions, fewer opportunities for higher qualifications, decreased safety and of course low salaries. Physicians would try to practice in a place where career growth and respect are provided besides better financial conditions. The WHO (2006) pointed to the reasons behind emigration of health workers from four African countries (Cameroon, South Africa, Uganda and Zimbabwe). Among these motivations, arranged by degree of importance are better salaries, safer environment, living conditions, lack of facilities, lack of promotion,

No future, Heavy workload, to save money, work tempo, declining health services, economic decline, poor management and upgrade qualifications.

Other motives can lead to emigration such as negative reactions to training programs (Shephard, 1977), unqualified medical education, cost of enrolling in a medical school or enrollment selection methods. The description of the medical school system in the countries under study is then necessary to understand the differences that lead to the emigration choice. The medical schools systems will be discussed in a subsequent section including the number of schools, the number of enrolled and graduates in addition to the number of years to obtain a medical doctor degree per country.

Since the determinants of medical doctor emigration are established and they are heavily related to salary benefits of receiving countries, the following section describes the facts about the phenomenon of physicians' emigration. There are databases in the literature that report the level of emigration of such professionals along with demographic description of each country considered. Data exists about the number of physicians per country, the number of physicians per 10000 people in each country and the number of graduates from health education in general. These elements are important in measuring the effect of such emigration on the sending and receiving countries in addition to the possible creation of collaboration between countries in terms of physicians' need.

I.2.4 Medical Educational Systems & Costs of Education

Given that one of the determinants of physicians' emigration is related to the quality of medical education provided in the country, a description of the medical school systems for the four groups of countries follows.

A. Eastern and Central European (ECE) Countries

Starting from the ECE countries, it has been found that the duration of education in these countries is around 6 years for a degree as a medical doctor. The number of universities or medical institutes differs per country with the largest number in Russia, Ukraine, Poland and Romania. However, the large number of universities in Russia is explained by the equally large total population compared with the countries in the group (Table I.2.4.1). Besides, the costs of education are lower when compared to the remaining European countries and costs of living are affordable for students.

Table I.2.4.1: Cost of Medical Education in ECE Countries

Country	Number of Med. Schools	Total Fees Per Year (USD)		For Students	Duration (Yrs)
		MIN	MAX		
Eastern European Countries					
Belarus	4	4374	5204	All	6
Bulgaria	6	9000	12000	All	6
Czech Republic	6	12544	18119	International Students	6
Estonia	1	6307	7795	All	6
Hungary	4	20539	21039	All	6
Latvia	2	4778	16828	All	6
Lithuania	2	14505	18005	All	6
Poland	12	12038	20571	All	4/6-year MD
Romania	11	6551	13894	All	6
Russia	58	3280	8600	All	6
Slovakia	3	15928	16625	All	6
Slovenia	2	8341	14704	All	6
Ukraine	23	5650	7500	All	6

Sources: www.bma.org.uk/international/working_abroad; List of references for ECE.

There are advantageous costs for students coming from other European countries in case they want to join an ECE medical university whose country is member of the European Union. Table I.2.4.1 provides data about the cost of education for the ECE countries.

Russia has 58 medical schools listed in its directory of medical schools. The first stage of medical studies lasts for six years[2] for an MBBS (Bachelor of medicine & bachelor of surgery) and five years for a BDS (Bachelor's in Medical Studies). Russian medical degrees are recognized globally and have good rankings from the WHO and the UNESCO. The Russian medical education is more affordable than other European countries, it provides studies in both Russian and English and offers well-equipped, multi-profile hospital clinical practice. Admission to medical schools is easy since the no entrance test is required[3].

There are four medical universities in Belarus. To enter medical school, the student needs to have completed two years and ten months of secondary medical education. As for foreign students, they need to study at the Preparatory Departments of the Faculties for Foreign Students the necessary subjects to enter the University, including Russian, biology, chemistry, mathematics and physics[4]. After, graduation, graduates go through a

[2] http://www.indiaeducation.net/studyabroad/russia/
[3] http://studyplaces.com/articles/330126-low-cost-medicine-study-in-europe-china
[4] http://www.escapeartist.com/studying_abroad/Foreign_Medical_Schools_Europe.html

one-year qualification apprenticeship where they work as doctors-probationers supervised by skilled doctors.

Bulgaria has six medical schools, offers a six-year course of medical study and the official language of education is primarily Bulgarian but many Bulgarian medical schools started offering programs in English except for clinical years where Bulgarian is required. European candidates are required to pass an exam in biology and chemistry[5]. The prerequisites for joining a Bulgarian medical school include completing high-school. The first two years of education are pre-clinical, the following three years are clinical training and the sixth year is the hospital internship year. The student is provided the degree of physician after the successful completion of the six years of study and the state exams. For specialization, graduates have to take tests and interviews in order to obtain a place in a specialization program either in internal medicine (5 years), general practice (3 years), cardiology (4 years) or general surgery (5 years)[6].

Estonia has only one medical school at the Tartu University. Medical studies last for six years that can be followed by specialty training that lasts for four to five years. Training for general practice generally takes three years[7]. Hungary has four medical schools that provide a six-year medical program to obtain a physician degree[8]. The first two years are about theory, followed by a third year about the theoretical foundations of disease and preliminaries in medicine and surgery, the fourth and fifth years focus on pharmacology and training in various clinical subjects and during the sixth year, students take their final examinations preceded by internship periods. Entry to polish medical schools requires the completion of secondary/ high school while honors in biology, chemistry and physics are highly recommended[9]. Medical education in Poland lasts either four or six years including practical training.

In Romania, there are eleven medical schools that provide six years of full-time study. To get admission to medical school, candidates need to pass a human biology, organic chemistry and/or physics test. The first three years of study are dedicated to pre-clinical curriculum while the following three years focus on clinical general medicine and

[5] http://en.wikipedia.org/wiki/Medical_school#Bulgaria
[6] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=5
[7] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=9
[8] http://en.wikipedia.org/wiki/Medical_school#Hungary
[9] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=24

surgery. In order to obtain the physician degree, students should pass the final exam and present a dissertation on a chosen subject[10]. Besides, the junior doctor needs to pass a National Residency Exam in order to enter medical training and practice medicine. The graduate can register for specialization according to the pass mark on the exam. The specialization can last from three to seven years[11].

Slovenia has two medical schools and studies last for six years followed by two years supervised practice for students to obtain their degree[12]. Ukraine has 23 medical schools and institutes that provide a six-year course of study. Ukrainian universities are recognized by international organizations such as the WHO and the UNESCO among others. The advantages of these universities are the cost differential in terms of education and living compared to other European countries and the offering of education in different languages such French, Russian and English[13].

B. Other European Countries

The other European countries include Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United kingdom. Medical studies require five to seven years of studies and are expensive for some countries when education is not public except for France. The total fees reported in US dollars include the approximate cost of living in a given country for ten months per year. For some countries, the fees seem to be huge while it is rather the expensive living costs in that country that enlarge the figure (Table I.2.4.2). There are countries that have many medical universities in various national regions and countries that provide advice for foreign students. Spain has the largest number of medical schools in this group while Luxembourg does not have any medical school.

Table I.2.4.2: Cost of Medical Education in the Other European Countries

Country	Number of Med. Schools	Total Fees Per Year (USD)		Duration (Yrs)
		MIN	MAX	

[10] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=26
[11] http://en.wikipedia.org/wiki/Medical_school#Romania
[12] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=28
[13] http://www.tostudyinukraine.org/study-medicine-in-ukraine.html

Other European Countries				
Austria	4	4215	12452	6
Belgium	9	10586	14781	7
Denmark	4	6450	31616	6.5
Finland	5	5125	6075	6
France	33	14168	34845	7 / 6 + 2.5 / 4 to 5
Germany	37	8463	12126	Min 6
Greece	7	10063	19680	6/5 to 7
Iceland	1	3448	12569	6
Ireland	6	12405	33591	6
Italy	29	6690	20210	6
Luxembourg	0	-	-	-
Netherlands	8	11805	26259	6
Norway	4	8911	15326	6 / 6.5
Portugal	8	6993	17832	6
Spain	38	6000	27701	6
Sweden	6	35699	47442	5.5
Switzerland	5	14615	28092	6
United Kingdom	32	26769	44718	5

Belgium has nine universities that provide medical training for seven years including clinical training starting from the fifth year. The first three years are theoretical and lead to a bachelor degree. Students are allowed to enroll in a master in medicine courses which consist of four years of theoretical and clinical studies[14]. Then, the graduates can join general practice that lasts for three years starting from the seventh year of undergraduate training or choose a specialty training that starts after undergraduate training[15]. Denmark has four medical schools that provide a six-and-a-half-year medical course of study followed by eighteen months pre-registration training to qualify for the doctor degree. Six months are dedicated to surgery, six months in medicine and six months in general practice. Then, the graduate can be registered and practice as a doctor but general practice requires further specialist training[16].

Finland has five medical universities and studies last for six years. Admission is regulated by entrance examination. The first two years involve pre-clinical theoretical courses followed by a four-year clinical period including work in various hospitals and health care centers[17]. Medical students experience a problem based learning and have contact

[14] http://en.wikipedia.org/wiki/Medical_school#Belgium
[15] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=4
[16] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=8
[17] http://en.wikipedia.org/wiki/Medical_school#Finland

with patients early in their studies. Depending of the specialization, students have the choice between five and six-year specialist training. Training is regulated by the National Board of Medico-legal Affairs (NBMA) and the five medical faculties. To be a general practitioner, doctors must complete two years of training in basic healthcare and hospital practice, with a minimum of six months in each[18].

France has more than 30 medical universities and basic medical education lasts for 6 years followed by general practitioner training or specialization (6 + 2.5 years or 6 + 4 or 5 years). Admission to medical schools is controlled by competitive exams. Medical education is based on three steps: (1) the first two years, (2) four years and (3) then two years and a half to train for general practitioner or four to five years to train as a specialist[19]. Germany has 37 medical universities and studies last for a minimum of six years. Admission is based on the final GPA score of the applicant on the secondary school diploma. The first two years of medical studies involve pre-clinical courses completed by a federal medical exam that students should pass. This is followed by the three-year clinical stage and then the last year of medical school that is also called the 'practical year'[20]. This is followed by four months of clerkships (two in a hospital, one at a doctor's office and one elective). Then, a final federal exam takes place before graduates receive their degrees of physician with a license allowing them to practice medicine or of Doctor of Medicine when, in addition, the graduate successfully completed a scientific dissertation[21]. The German government subsidizes medical education, leaving a minimal tuition amount for students to pay[22].

Greece has seven medical universities and medical training lasts for six years that can be followed by postgraduate training for 5 to seven years. There is a final examination at the completion of the training that precedes the award of the specialist status. Greece has a high ration of physicians per 1000 people but the majority of doctors are located in Salonika and Greater Athens. Thus, the medical programs require periods in rural practice as a way to address the problem of physicians' distribution[23]. Iceland has only

[18] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=10
[19] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=11
[20] http://en.wikipedia.org/wiki/Medical_school#Germany
[21] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=12
[22] http://www.amsa.org/AMSA/Homepage/Publications/TheNewPhysician/2009/1209IntlTraining.aspx
[23] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=13

one medical university and studies last for six years. Admission to medical school is based on passing an organized test, controlled by the University of Iceland[24]. Before being registered as practitioner at the ministry of health, students should undertake 12 months of pre-registration training. Then, the doctor is allowed to start specialist training that can last for four and a half years[25].

Ireland has six medical schools and provides medical studies in the form of a four-, five- or six-year program depending on the satisfaction of prerequisites. Admission is based on secondary school qualifications for the six-year program while the four-year program accepts candidates with previous university degrees. Medical courses include pre-clinical and clinical courses[26]. The Irish Medical Council regulated medical education. Thus, after receiving a BMBS (bachelor of medicine and bachelor of surgery) and before registration is pronounced, the graduate is required to undertake a training year as an intern under supervision[27]. In order to obtain membership of the appropriate royal college, doctors have to take an examination. Italy has 29 medical universities and studies last for six years. Since there are few restrictions to entry to Italian universities, Italian medical schools produce more physicians than the health system can employ[28]. The quality of education has been criticized for being too theoretical and classed for being too crowded. Besides, post-graduate training is highly competitive and medical doctors' unemployment is high. Admission to medical school test is supervised and administered by the ministry of education, universities and research (MIUR). The first three years of the program are based on 'biological' subjects while the following three years are devoted to 'clinical' subjects[29]. Over the six-year program, most medical schools require taking 36 exams in addition to compulsory rotations and elective activities. Students should also defend their thesis by the end of the program before a board of professors. This thesis is usually prepared during the same year the student starts the internship program by the fifth or sixth year.

[24] http://en.wikipedia.org/wiki/Medical_school#Iceland
[25] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=15
[26] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=16
[27] http://en.wikipedia.org/wiki/Medical_school#Ireland
[28] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=17
[29] http://en.wikipedia.org/wiki/Medical_school#Italy

Luxembourg lacks its own medical school. In this case, every physician wishing to practice in the country should be registered with the Minister of Health free of charge[30]. Thus, applicants who complete the requirements of directive 93/16/EC must finish an application form obtained from the Health Ministry and provide their original medical diploma, certificate of nationality and a certificate of good standing. In the Netherlands, there are eight medical school and studies last for six years (three in pre-clinical and three in clinical studies[31]). Admission to medical schools is based on the completion of the highest level of secondary school. Graduates can specialize immediately after graduation after passing an interview to join a training program that lasts for a minimum of 5 years. They will work under the supervision of a senior medical specialist. Research experience and publications are expected from these trainees. General Practitioners complete a three year specific training program before being allowed membership to the Royal Dutch Medical Association's register of general practitioners[32].

Norway's four universities provide a six-and-a-half year medical program that is followed by 18 months of supervised clinical training (12 months hospital based and six months with a general practitioner[33]). Admission to medical schools is based on a relatively high GPA from secondary school. Once the six-year program is completed, students receive a candidatus medicinae degree and are granted a medical license after completing the 18-month training by the Norwegian Registration Authority for Health Personnel. Then, the doctor can apply for specialist training and choose among the 43 recognized medical specialties in Norway[34]. Specialist training programs last for 5 to 6 years and specialist approval is granted after 9 years and is the prerequisite for application for consultant positions. Specialist training for general practitioner lasts for 5 years including a two-year vocational training program.

Portugal has eight medical universities and studies last for six years followed by a pre-registration training[35]. After registration, doctors choose a career among hospital medicine, general practice and public health. Specialization as general practitioner

[30] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=20
[31] http://en.wikipedia.org/wiki/Medical_school#Netherlands_and_Belgium
[32] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=22
[33] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=23
[34] http://en.wikipedia.org/wiki/Medical_school#Norway
[35] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=25

includes a three-year vocational training program that leads to a 'generalist' diploma. Spain has 38 medical universities and studies last for six years (three in pre-clinical and three in clinical course). At the end of the program, the graduates receive the Licenciado en Medicina y Cirugia degree[36]. Specialist training is accessible to Spanish citizens and citizens of other European economic area (EEA) states after a competitive examination that is conducted in Spanish only. Successful candidates undertake a three to four years or even longer residency program. Concerning, the general practitioners, they spend their final year in training practice after they pass a separate exam.

Sweden has six medical universities and undergraduate medical courses last for five and a half years followed by an 18-month internship (6 months in family medicine and one year in rotation of various major specialties[37]). After completion of internship and award of registration, the doctor can undertake a specialist training that lasts at least five years. Sweden has 52 recognized medical specialties[38]. General practitioners should complete a five-year program that leads to the title of specialist in family medicine. Switzerland has six medical universities and studies last for six years followed by general and specialist trainings[39]. Medical education is regulated by the Federatio Medicorum Helveticorum (FMH).

The UK has 32 medical universities that offer medical education and award the degree of Bachelor of Medicine and Bachelor of Surgery after the completion of the medical program. Admission to UK medical schools is based on A-levels, a good performance in various skill tests or an interview. The UK methods of education vary between problem-based learning, traditional pre-clinical/ clinical program and integrated approach combining different methods[40]. UK doctors enter a two-year foundation program after qualification and are awarded full General Medical Council (GMC) registration at the end of the first year and can apply for specialist training after the second year. Besides, medical schools in the UK offer accelerated graduate entry programs (four years).

[36] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=29
[37] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=30
[38] http://en.wikipedia.org/wiki/Medical_school#Sweden
[39] http://www.bma.org.uk/international/working_abroad/EEA.jsp?page=31
[40] http://en.wikipedia.org/wiki/Medical_school#United_Kingdom

Medical education lasts for five years and students begin medical school as college undergraduates[41].

C. MENA Countries

These countries include Algeria, Egypt, Iran, Iraq, Israel, Jordan, Lebanon, Libya, Morocco, Syria, Tunisia, Turkey and Yemen as MENA countries. Medical studies require between four in Lebanon and seven years of study and tuition fees differ among a majority of public medical schools and some private ones. Table I.2.4.3 describes the total fees incurred per year in US dollars. It is observed that Morocco, Tunisia and Yemen have the lowest fees in the group while Lebanon, Jordan, Iran, Turkey and Israel have the highest fees. However, in Turkey, for example, the minimum fee is considered low. This is explained by the low level of fees required by public universities and the difference in the amount of tuition fees between local and international students.

Table I.2.4.3: Cost of Medical Education in MENA Countries

Country	Number of Med. Schools	Total Fees Per Year (USD)		Duration (Yrs)
		MIN	MAX	
MENA Countries				
Algeria	11	3680	15180	6 / 7
Egypt	18	7251.23	21466.27	6 / 7
Iran	49	6000	29800	7
Iraq	13	9000	20000	6
Israel	4	20250	23250	6 yrs/ 7 yrs
Jordan	4	6617.5	34745.9	6
Lebanon	7	9430	36020	4 to 7 yrs
Libya	4	4060	16747.8	6
Morocco	5	683.4322	4309.931	7
Syria	6	6199.29975	18406	6
Tunisia	4	1877.516	7218.32	5 or 7 yrs
Turkey	50	6100	26460	6 or 7 yrs
Yemen	6	2920	8310	6 or 6.5 yrs

Algeria has eleven medical schools and the duration of basic medical education lasts for six or seven years including medical training. At the completion of this latter, the student is awarded the degree of 'Docteur en Médecine' (Doctor of Medicine) and granted the license to practice medicine by the Algerian ministry of health and population[42]. Egypt

[41] http://www.amsa.org/AMSA/Homepage/Publications/TheNewPhysician/2009/1209IntlTraining.aspx
[42] http://www.who.int/hrh/wdms/media/en/Algeria.pdf

has 18 medical universities and studies last for six years to obtain a degree of bachelor of medicine and bachelor of surgery. Admission to Egyptian medical schools is based on the applicant's score on the last two-year secondary school. There is a very strict quota to the number of student accepted by the admission office which regulates entry into public universities but this is not applicable to private universities. The first three years of medical school cover the basic medical sciences, while the last three years involve clinical sciences. After the end of the program, the graduate is required to undertake a year of full-time internship at one of the University or Government Teaching hospitals. Then, a medical license as a General Practitioner (GP) is received, followed by registration with the Ministry of Health and the Egyptian Medical Syndicate[43].

In Iran, there are 49 medical schools and basic medical education is provided in seven years including practical training while additional two years should be spent in government service before the degree is awarded. It is compulsory for the physician to register with the Medical Council of Iran in order to get a medical license to practice[44].

Iraq has thirteen medical schools that provide medical education for six years. Medical registration is compulsory with the Iraqi Medical Association. The medical license to practice is delivered to holders of a Bachelor of Science in Medicine and General Surgery from a recognized medical school in the country. The license is granted after completion of a 2-year internship (rural and national service) by the graduate. Graduates who received their degree from abroad should get it validated by the Ministry of Higher Education and Scientific Research. On the other hand, foreigners can practice in Iraq if they hold a contract with a government agency or if a reciprocal agreement exists between their country and Iraq. Besides, work in government service after graduation is compulsory for Iraqi graduates (25 years)[45].

Israel has four university medical schools and studies last for six years. As of 2009, Tel Aviv University has introduced a four year program for students with a bachelor's degree in biological sciences-related fields. Admission to medical schools requires an elevated high school baccalaureate average and psychometric examination high grade. Israel is

[43] http://en.wikipedia.org/wiki/Medical_school#Egypt
[44] http://www.who.int/hrh/wdms/media/en/Iran.pdf
[45] http://www.who.int/hrh/wdms/media/en/Iraq.pdf

experiencing a growing demand for medical education while there is a lack of doctors[46]. Jordan has four medical institutes inside state universities and studies last for six years followed by the award of the bachelor of medicine and surgery (MBBS). The program includes three years of medical sciences and three years of clinical practice[47]. After completion of medical education including an 11-month internship in the four main departments of a teaching hospital, the graduates are awarded the degree of Bachelor of Medicine and Surgery. Medical registration with the Jordan Medical Association is necessary and license to practice is granted by the Ministry of Health to graduates. Graduates of foreign medical schools must validate their degree and foreigners must hold a residence permit to practice in Jordan[48].

Lebanon has four medical schools and medical education is provided for four to seven years including practical training. The graduates are awarded the degree of Doctor of Medicine (MD)[49]. Libya has four medical schools and studies last for six years with an additional year of supervised clinical practice. The degree of Bachelor of Medicine and Bachelor of Surgery (MB, BS) is awarded after completion followed by compulsory medical registration with the General Medical Syndicate of the Libyan Arab Jamahiriya. The license to practice medicine is granted by the General Directorate for Health Affairs, Ministry of Health and Social Security, Tripoli, to graduates of a recognized medical school after fulfillment of the 1-year internship[50]. Libya has agreements with universities in other Arab countries and in Eastern and Western Europe. Graduates who obtained foreign degrees need special authorization to practice. Besides, it is necessary for Libyan graduates to work in government service after graduation.

Morocco has five university hospital centers (public universities) where medical education is provided for seven years including practical training and an additional 1-year internship that is required before the degree of 'Docteur en Médecine' (Doctor of Medicine) is awarded. Medical registration is obligatory with the Conseil national de l'Ordre des Médecins. The license to practice medicine is granted by the Secrétariat

[46] http://en.wikipedia.org/wiki/Medical_school#Israel
[47] http://en.wikipedia.org/wiki/Medical_school#Jordan
[48] http://www.who.int/hrh/wdms/media/en/Jordan.pdf
[49] http://www.who.int/hrh/wdms/media/en/Lebanon.pdf
[50] http://www.who.int/hrh/wdms/media/en/Libyan_Arab_Jamahiriya.pdf

général du Gouvernement to graduates of a recognized medical school[51]. Besides, Morocco established agreements with French and Spanish universities. In Syria, there are six medical schools (4 public and 2 private) and education lasts for six years including practical training. The degree of Doctor of Medicine is awarded after completion of medical education requirements[52].

Tunisia has four medical schools located in the major cities and studies last for five years. Admission is based on the success and on the score in the high school degree. The first two years include medical theory while the last three years consist of clinical training involving all medical specialties. During the last three years, the student has the status of 'Externe', has to attend at the university hospital every day, rotating around all divisions and then has to take clinical exams to test knowledge in a particular specialty tried. After Then, there are two years of internship, in which the student is basically a physician under the supervision of the chief doctor[53]. The student can choose between taking the residency national exam or extending his internship for another year that will allow him to gain the status of family physician. The residency program consists of four to five years in the specialty of qualification and the choice depends on the national residency examination score. Besides, a doctorate thesis to defend in front of a jury is required from the student to be awarded the degree of Doctor of Medicine. Medical education is free for all Tunisian citizens and for foreigners who have scholarships.

Turkey has 50 medical schools and studies last for six years where the first three years include pre-clinical courses and the last three years involve clinical training. Admission is based on passing the MCQ exam that covers most of the high school and secondary school curricula. After graduation, students can either work as general practitioners or pass the Medical Specialization Examination (TUS) to be able to undertake residency in a given department of a hospital. There are both public and private medical schools and the language of instruction is mainly Turkish with English for few universities. These are among the reasons that make Turkey a famous place to study medicine for students from the MENA, the Balkans and in less often from North Africa[54]. Yemen has six medical

[51] http://www.who.int/hrh/wdms/media/en/Morocco.pdf
[52] http://www.who.int/hrh/wdms/media/Syrian_Arab_Republic.pdf
[53] http://en.wikipedia.org/wiki/Medical_school#Tunisia
[54] http://en.wikipedia.org/wiki/Medical_school#Turkey

schools that provide six to six and a half years of medical education including practical training[55]. After completion, the degree of Bachelor of Medicine and Surgery (MB, BS) is awarded.

D. Other MENA Countries

This group includes countries with emigration history as receiving countries from the region and outside. They are Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and The United Arab Emirates as other MENA countries. Medical studies require between six and seven years of study and tuition fees are very expensive especially for private medical schools. The following table shows that Saudi Arabia has the largest number of medical schools. Kuwait and Qatar have only one each. The cost of living in these countries is very high as described in the table. In addition, tuition fees for medical student have increasing trends especially in private universities.

Table I.2.4.4: Cost of Medical Education in other MENA Countries

Country	Number of Med. Schools	Total Fees Per Year (USD)		Duration (Yrs)
		MIN	MAX	
Other MENA Countries				
Bahrain	4	43430	112045	6
Kuwait	1	25415	31607	7
Oman	2	22500	41500	7
Qatar	1	63753	85625	6
Saudi Arabia	25	23500	46500	6
United Arab Emirates	4	41294	71046	6 or 7 yrs

Bahrain has four medical schools that provide education for six years with an additional year of supervised clinical practice required before the degree of Doctor of Medicine (MD) is awarded. Medical registration and license granting are compulsory with the Licensure Office, Ministry of Health, to graduates of a recognized medical school who have successfully completed an internship year and passed the license examination[56]. Besides, Bahrain established agreements with all Gulf States and the Arab Board of Medical Specialties. Kuwait has only one medical school, the Health Sciences Center (HSC) in Kuwait University and provides studies for seven years. The degree of Bachelor

[55] http://www.who.int/hrh/wdms/media/Yemen.pdf
[56] http://www.who.int/hrh/wdms/media/en/Bahrain.pdf

of Medical Science, Bachelor of Medicine and Bachelor of Surgery (BMedSc, BM, and BCh) is awarded after the completion of the seven years[57].

In Oman, two medical schools exist and provide education for seven years including practical training with an additional required year of supervised practice. Upon completion of this latter, the degree of Doctor of Medicine (MD) is awarded. Medical registration with the Ministry of Health is compulsory and the license to practice medicine is granted to graduates of a recognized medical school who have completed a 2-year internship. Besides, graduates of foreign medical schools must pass a local qualifying exam to validate their degree. Bahrain has an agreement for limited registration with the General Medical Council of the United Kingdom[58]. Qatar's only medical school is Weill Cornell Medical College (WCMC–Q). It provides education for six years. The first two years include five consecutive integrated basic science courses (Molecules, Genes and Cells, Human Structure and Function, Host Defenses, Brain and Mind, and Basis of Disease) and year-long "patient-doctor" courses known as Medicine, Patients and Society I and II. The following two years are based on clinical curriculum that introduces students to the clinical years. The fifth year is about traditional clerkship rotations in the principal clinical disciplines. The sixth year involves selective and elective courses[59].

Saudi Arabia is considered among the other MENA countries in this chapter. It has 25 medical schools, all free of charge for Saudi citizens and studies last for six years. There are 21 nonprofit and four private medical schools in Saudi Arabia[60]. Admission to medical schools requires passing an entrance examination and completing a 1-year pre-medical course containing basic medical material. Passing this latter is considered most challenging. Then, there are five medical years of study and one training year. The schools offer an MBBS (Bachelor of Medicine & Bachelor of Surgery) degree. As for the United Arab Emirates, it has four medical schools. They provide education for six or seven years including practical training[61].

[57] http://www.who.int/hrh/wdms/media/en/Kuwait.pdf
[58] http://www.who.int/hrh/wdms/media/en/Oman.pdf
[59] http://qatar-weill.cornell.edu/education/admin/premed/preFees.html
[60] http://en.wikipedia.org/wiki/Medical_school#Saudi_Arabia
[61] http://www.who.int/hrh/wdms/media/en/United_Arab_Emirates.pdf

I.2.5 Characterization of Graduation from Medical Schools

There are other variables that can be used to define the trends influencing the number of physicians per 1000 people. They include GDP per capita, retirement rates, income growth, number of graduates from health education and other factors. The number of graduates in health (1000s) includes all human resources for health and is taken from the World data bank (WB) as shown in Table I.2.5.1.

Table I.2.5.1: Number of graduates in health (1998-2009)

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Eastern European Countries												
Belarus							6871	7568	6777	4501	4744	4652
Bulgaria		5695	3966	3561	3551	3096	2886	3032	0	2814	3698	
Czech Republic		5625	6709	6660	6305	6451	5729	5996	8587	8063	7958	
Estonia		406	596	821	906	1315	1358	1279	1339	1378	1154	
Hungary		3289	4330	4519	5219	5085	4738	5653	6151	0	6493	
Latvia		835	774	446	633	792	926	1254	1375	1542	1917	
Lithuania		2102	2774	2764	3064	3851	4265	4183	3896	4226	4387	
Poland				8199	8675	8760	11261	35679	39457	43818	47654	
Romania		5910	5229	5474	5656		17531	17770	16810	24512	22526	
Russia							101588	108070	108088	120580		
Slovakia		3421	3098	3622	4144	4302	5100	5065	6873	8767	11135	
Slovenia		1015		1283	1416	1432	1357	1723	1703	1312	1335	
Ukraine		33118		32128	32985	34038	34746	35707	36731	38189	39671	
Other EU Countries												
Austria			2399	2811		3218	3148	3335		3503	4868	
Belgium			13880	14510	15123				15386		20002	
Denmark		8621	9611	10262	10149	11184	11359	12097	11313	11026	11187	
Finland	9339	8596	8120	8011	8226	7305	7317		7743	8144	8607	
France		35306	38357		38141	44248	80714	83474	86973		90312	
Germany		84823	79890	81446	79098	79387	80678	82859			85082	
Greece							3982	5827		9600		
Iceland		193	236	224	233	254	277	325	398	450	498	
Ireland	2694	3718	3442	4292	4821	6684	7250	6339	6490	7359	6601	
Italy	27090	32229	35536	28004	39735	47871	49947	53440	55960	59991		
Luxembourg												
Netherlands		16036	17097	17606	18218	18351	18298	18013	19361	21252	22528	
Norway		6917	6636	7227	7272	7661	7974	8214		8681	8306	
Portugal			7790		9988	10612	10761	12534	14811	15903		
Spain		29129	30439	33174	35387	37680	38421	40690	40726	40533	44669	
Sweden		8837	9032	8961	9798	11306	14592	14038	15344	15007	14845	
Switzerland		7013	6656	6621	6978	6391	6849	6190	7557	10698	10936	
UK		83269	64004	100681	105019	114584	105860	115686	117155	118823		
MENA												
Algeria										6243		6898

Egypt												
Iran							29463	31445	32134	25990		36073
Iraq			3059				8695					
Israel			3026									
Jordan							3860	4731		6459		
Lebanon			1669	1644	1756		2383	2890	3365	3822	4546	4576
Libya												
Morocco				1810				2505	2631	4074	4442	4705
Syria												
Tunisia												
Turkey				16840	17976	18630	19511	22840	21271	25148	26014	
Yemen												
Other MENA												
Bahrain						309		317	270			
Kuwait												727
Oman										918	981	1035
Qatar			24	56	39	49				69	133	299
Saudi Arabia							4836	4479	6738	9072	9888	10779
UAE										680		

The raw numbers presented in Table I.2.5.1 cannot shed light over the quality and effectiveness of graduates in health unless it is relative to the total population in each country. However, from an initial observation the number of graduates is highest in the other European countries.

It has been observed that some countries lack qualified physicians and others happen to have more graduates than needed nationally. The theory is to explain these inequalities by the medical schooling system in different countries, the number of schools per country, the differentiation between public and private universities, the costs of medical schools and selection criteria behind the enrollment of students into medical institutes. The following section describes the countries' medical school systems and provides data about the cost of education including approximate living costs per country studied.

Conclusion

The emigration of physicians is determined by many factors that can be the quality/ cost of medical education, the selection process for enrollment of future medical doctors or demographic issues but the major determinant found is the salary advantage provided in destination countries. A small comparison of relative wages provided hypothetical

patterns of emigration among the four groups of countries. It has been observed that given the wage benefit, physicians from all MENA countries could be moving to practice in the Other European Countries (OEC). Besides this, Medical doctors from ECE Countries could move to practice in the Other European Countries and the ECE physicians could be moving to practice in all MENA countries except Egypt, Yemen and Algeria.

Given that emphasis has been made on the role of medical education in the emigration decision of physicians, the cost of medical education has been considered in this chapter as an important element in the emigration reasoning. It has been observed that the Other European Countries have the highest education costs in average when considering all groups except the Other MENA Countries (because of their special context). The ECE and the MENA countries have approximately comparable tuition fees with some exceptions such as Morocco, Tunisia and Yemen. These observations confirm the pattern of emigration defined above. For example, a MENA student can seek medical education in an ECE Country and then emigrate to one of the Other European Countries to practice medicine.

However, the effect of the increasing high costs of medical education can have reverse effects on the affordability of medical education to good applicants from poor families. Providing medical education for wealthier students increases their chances of emigration to wealthier countries and leaving the developing country of origin in shortage of skilled medical doctors and in public health crisis. Increased costs of medical education can also create long-term indebtedness for medical students. The elevated cost of medical education represents a major problem that is in search for applicable strategies and solutions as to help extract the benefits from the increased emigration of medical doctors. This evidence leads to future studies on the role of medical schools, governments and the public sector in ensuring the optimal number and quality of medical doctors.

I.3 Understanding the Economics of Migration of Medical Doctors in the Context of the EU

The objective of this sub-part is to analyze the mobility of health professionals, in particular medical doctors in the context of the European Union (EU) to address some

major policies and strategies related to immigration. This provides the major characteristics of the health systems in relation to availability of medical doctors and their mobility. In this process, both the qualitative and quantitative components of the migration of medical doctors are addressed. Annual data and information are gathered from national reports and from several international organizations. The Organization for the Economic Cooperation and Development (OECD) and World Health Organization (WHO) are major sources.

The attained results show that immigration of medical doctors occurs within and outside the EU. There is a great variation in the proportion of foreign doctors across countries in Europe. In some countries, the reliance of foreign medical doctors is high: Switzerland, Ireland, United Kingdom (UK), and Slovenia. The largest inflows of medical doctors are reported to be in the UK, Germany, and Spain. Outflows of medical doctors have increased in Germany, UK, Italy, and Austria. But, the net balance between emigration and immigration matters. Germany looses more doctors every year that it gains through immigration.

Migration of health professionals has globally increased in the last years. By loosing health professionals, already fragile health systems in middle and low income countries may be further weakened. This recruitment is threatening the viability of crucial health programs in poor countries. It also involves ethical aspects in this recruitment of health professionals. In respond to the global health workforce crisis, the WHO adopted on 21 May 2010, the Global Code of Practice for the International Recruitment of Health Personnel[62]. This code discourages the recruitment of health professionals from countries with shortages and provides guidance to strengthen the workforce and national health systems across the world.

This code has also relevance for Europe, and the WHO Europe has strongly recommended the development and adoption of the Code. It stresses the strengthening and further development of education and training, coordination of labor market activities, and it addresses the misdistribution of health professionals through educational measures, financial incentives, and regulatory procedures.

[62] Available at http://www.who.int/hrh/migration/code/practice/en/index.html

The publication of the World Health Report (WHO, 2006) "Working together for Health" has brought attention to the global human resources required to produce health. This report estimates that 57 countries, particularly in Sub-Saharan Africa and South East Asia, have an absolute shortage of 2.3 millions of doctors, nurses and midwifes (WHO, 2006, p.13). This implies that many countries do not have enough health care professionals to deliver essential health interventions. Recent estimates also how that there will be dramatic shortages in Africa by 2015 (Scheffler et al., 2008).

In 2004, the Europe region has over 35% of the world's supply of physicians along with about 32% world's health expenditure. In contrast, countries in South East Asia suffer the highest proportion of the Global Burden of Disease with only 11% of the world's supply of physicians and 1 % of world's health expenditures. Similarly, Africa experiences 24 % global burden of disease while having only 2% of the global physician supply and spending that is less than 1% global expenditures. This shows clearly huge disparities in the global distribution of medical doctors around the world (Sheffler et al., 2008).

Planning for health human resources has become a priority at the European level. The European Commission published on 10 December 2008 the "Green Paper on the European Workforce of Health" (EU, 2008) with the aim of describing the challenges faced by health professionals in all member states, such as ageing of the general population and of the health workforce, the migration of health professionals in and out of the EU, as well as the brain drain from third countries[63]. Recently, a bigger European project, the PROMeTHEUS has been launched in 2009 for a 3 year period. The research project cover all EU member States and selected neighborhood countries in order to understand the mobility impact on health services and system in countries importing and exporting staff [64].

The main idea is that mobility of health professionals can influence the performance of national health systems, and these impacts are increasing in light of increasing mobility in Europe. The main argument is that the mobility of health professionals changes the composition of the health workforce in the source and receiving country which in turn influences on health systems performance.

[63] http://europa.eu/legislation_summaries/public_health/european_health_strategy/sp0005_en.htm

[64] See http://www.euro.who.int/en/home/projects/observatory/activities/research-studies-and-projects/prometheus

The aim of this sub-part is to provide a description of the stock and flows of medical doctors within and outside the EU. Besides that, a discussion of national regulations, medical education and provision of future projections are planned. A major focus is placed on the characterization of the health systems in Europe. It addresses the levels of stocks, flows besides the needs and shortages in medical doctors. The impacts of the enlargement of the European Union in relation to the above parameters are also introduced. The factors behind migration as they have been reported in the literature are also discussed. This is followed by a description of the regulatory framework governing the access to the medical practice. But, as education is an important component for both satisfying the needs of the destination countries and ensuring indirect benefits to the countries of origin, medical education is also introduced. All these elements are then re-discussed in relation to the new economics of skilled labor migration.

I.3.1 Method pursued

The overall method used is that of literature survey where different pieces of knowledge about the subject are consolidated for the purpose of the current study. It is based on the existing information in medical and economics literature. A relevant search of the formal literature is through EconLit, and PubMed search engines. Data are collected from several sources. In particular, information is extracted from the databases of international organizations such as the OECD and World Health Organization (WHO). A study conducted by the World Health Organization (WHO) provides an overview of 53 European countries. The report is published in 2009 and contains data for the latest year 2005. Other OECD reports provide relevant information. The first one is that of Dussault et al. (2009). They report a substantial increase in mobility of health workers between 1995 and 2005 in 12 selected OECD countries, including 8 European countries (Denmark, Finland, Ireland, the Netherlands, Norway, Sweden, Switzerland, and the United Kingdom). This study also indicates that migratory flows of health workers are generally poorly documented.

Another report deals with the crisis in the health workforce, and includes analysis of flows data and reliance of foreign health professionals (OECD, 2008). The third one examines how the financial crisis has influenced mobility trends (OECD, 2010). It

includes the European free movement area and makes reference to Norway, UK, Poland and Switzerland. Nevertheless, the results for these countries do not refer explicitly to health professionals. Finally, there is a joint report which presents data on the reliance of foreign health professionals (WHO/OECD, 2010) including 17 countries for medical doctors.

At country level, there are some case studies published on Member states that acceded to the EU before 2004, including UK (Jinks, 200), France (Cash and Ulmann, 2008), Germany (Buchan, 2008), Italy (Chaloff, 2008) and Ireland (Humphries et al., 2008). Other case studies were conducted in the new accession countries such as Czech Republic (Angelovski, 2006), Poland (Leniowska, 2007), and Estonia (Buchan and Pefilieva, 2006).

The main indicators used in this study include the practicing physicians per 1000 people for each European country, the proportion of foreign trained doctors over the total of physicians in each country and the expatriation rate. The former is a stock measure. There are also different definitions and terminology such as "foreign born", "foreign trained", and "country of origin". This latter is defined as the number of foreign born doctors working in OECD countries born in country i; with Yi = number of doctors working in country i; and emigration rate given by= Xi/(Xi+Yi). The flow of workers in and out of the country, which is itself a measure of the dynamism of the process and is crucial to understand the net balance of health professionals in any particular country. It should be also noted that it is also difficult to compare migration levels and flows across countries. Countries can also use several indicators with different values.

In what follows, we explore the following key policy makers' questions which form part of the core of the article:

- What are the main characteristics of mobility of medical doctors in the EU context (in terms of stock and flows)
- What have been the effects of the EU enlargement on mobility of medical doctors?
- What are the main motivations of the mobility of health workforce? Why do medical doctors leave their country while others stay or return?

- What is the role of mobility of medical students as source of temporary or permanent immigration? The role of European programs to promote mobility of EU students
- What policy options and regulatory interventions (recruitment policies, national regulations) can be employed to influence the mobility of medical doctors
- What are the main predictions of the new economics of immigration
- What are the main strategies to stem the brain drain?

I.3.2 Characterization of the Migration Patterns in Europe

As said above, this part focuses on the stocks and flows of medical doctors in different countries of Europe. It addresses also the implications of the EU enlargement, the motivating factors besides the constraints to migration. The role of education and its links with the availability of medical doctors in relation to the new economics of skilled labor migration are also introduced.

1. **Measuring immigration: stock and flows of medical doctors**

Measurement in terms of stocks and flows are respectively introduced and discussed.

1.1: Stocks

With regard to stocks and according to the WHO, there are 16.6 millions of health workers[65] in Europe, representing an average of 18.9 per 1 000 population. Health service providers account for 69% of these and health management and support workers represent 31% (5.1 million). Nevertheless, there is considerable heterogeneity in the distribution and composition of health workers between and within countries in the European Region (WHO Europe, 2007). Data on the stock of physicians reveals significant variations across regions. The highest density is registered in the Commonwealth of Independent states with 373.5 physicians per 100 000 population. The density of health workers tends to be highest in the European Union countries (see Table 1). Italy ranks the first doctor density (618 doctors per 100 000) and Albania ranks the lowest doctor density with 118 doctors per 100 000 population (see Table I.3.2.1).

Table I.3.2.1 Number of health workers per 100 000 population, 2002

Region	Physicians	Nurses	Midwives	Pharmacists
European Region	351.22	669.02	45.07	50.93
European Union	343.56	708.26	35.95	77.54
Central Asian Republics	293.14	767.68	66.9	16.38

[65] According to the World Health Organization (WHO), health workers are defined as "all people engaged in actions whose primary intent is to enhance health". One can distinguish between health service providers, and health system workers. Here we focus on health service providers such as physicians (see, WHO, 2006, p. 16).

Commonwealth of Independent states (CIS)	373.55	794.18	54.15	18.44
Lowest	118.54 (Albania)	245.15 (Turkey)	11.30 (Germany)	3.03 (Uzbekistan)
Highest	618.52 (Italy)	1856.91 (Ireland)	122.77 (Azerbaijan)	204.31 (Malta)

Source: WHO Regional Office for Europe (2007)

There is a wide variation in physicians' density in European countries. Statistics from the OECD (2008) suggest that Greece has the highest density with 4.9 practicing physicians per 1 000 population in 2005 or the latest year available. The second highest doctor density is found in Belgium with 4.0 practicing physicians per 1 000 population. The lowest density is found in Turkey with 1.5 doctors practicing doctors per 1 000 population. UK ranks among the least staffed high income countries with 2.4 practicing physicians per 1 000 population. Also compared to all EU member states, Spain has a high ratio of 3.8 practicing physicians per 1 000 population. Spain ranks after Greece, Belgium, and Italy (3.8 practicing physicians per 1 000 population). France and Germany registered 3.4 practicing physicians per 1 000 population. The average density of the OECD area was 3.0 practicing doctors per 1 000 population (see for more details, OECD, 2008). The number of doctors in UK, Ireland, Turkey, Poland, Finland, and Luxembourg is lower than the OECD average. In these countries, there is a concern of undersupply of doctors[66].

With regards to ECE countries, for instance, Poland has one of the lowest rates of doctor per 1 000 population among the OECD countries with 2.1 in 2005 (OECD, 2008). Hungary has a ratio of 3.0 practicing physicians per 1 000 population. The highest doctor density is found in Czech Republic with 3.6 practicing physicians per 1 000 population. The highest doctor density is found in Lithuania with 4.0 doctors per 1 000 population followed by Czech Republic and Bulgaria with 3.6 doctors per 1 000 population (Vladescu et al., 2008). In Romania, the number of physicians is still very low (1.9 per 1 000 population) compared with similar countries such as Bulgaria (3.6) and Latvia (3.2)

[66] Although, there is no a standard or minimum, the WHO estimated that countries with a density fewer than 2.8 doctors, nurses or midwifes fail to achieve a targeted 80% coverage for skilled birth attendance and immunization.

indeed compared with the European average of 3.4 doctors per 1000 population (Vladescu et al., 2008). In Romania, and Poland, there is a serious concern of shortages of doctors.

By 2000, several OECD countries report shortages of doctors and predicted an increased in demand for their services. For instance, this happens in countries such as UK, with a lower density of doctors but also in France, Germany, Ireland, and Spain with higher doctors' density. The "Wanless" report (2002) suggested that the UK was shortage of doctors. The demand for doctors could increase by about 50% between 2005 and 2020. Supply might increase by 27% leading to a projected shortage of about 20% in 2020 In France, recent projections from the French Ministry of Health indicate that the supply of doctors may decline by almost 10% between 2006 and 2020, even taking into account the possible increase in the student intake from 7000 places in 2006 to 8000 places from 2011 to 2020 (DREES, 2009). Considering the growth in population during that period, the doctor-to-population ratio in France is expected to decline sharply, to reach a level of less than 2.8 doctors per 1 000 population in 2020, down from 3.35 in 2007, a decline of over 15% (DREES, 2009) (see OECD, 2009). Moreover, regional disparities have been found. Thus, the Rapport Berland (2002) drew attention to regional disparities in relation to physician density, and the extent to which continuation of the current policy would decrease doctor densities (Berland, 2002). In Germany, it appears that the shortage of doctors is already being felt in hospitals where many vacancies can be only filled by foreign doctors. The health system is strongly dependent of the import of foreign doctors (Kopetsch, 2009). In Spain, Barber and López-Valcarcel (2010) estimated that the deficit of medical specialists will grow from 2% at present (2800 specialists) to 14.3 % in 2025 (almost 21000).

The European Commission10 forecasts that the EU will face a shortage of 1 million health professionals by 2020 if existing workforce problems are not addressed (WHO, 2011).

1.2: Flows: inflow and outflows

In relation to the flows of medical doctors, the migration of health workers is mainly to countries such as Australia, Canada, United Kingdom, Germany and the United States.

Dodani and LaPorte (2005) suggest that over three quarters of all migrant doctors are in the United States, the United Kingdom and Canada. The English language spoken by these countries facilitates the mobility of high skilled workers.

There is a variation in foreign medical doctors across Europe. Switzerland, Ireland and United Kingdom are the European countries with high reliance of foreign doctors. In a global context, the mobility in the top three European countries is also comparable to those in Australia, Canada, New Zealand and the United States (the major destinations worldwide). According to recent data, the United Kingdom is the country with the largest proportion of foreign trained doctors in the European Union, followed by Ireland (OECD, 2008). In 2008, about 38% of doctors in the UK have been trained abroad. This is more than one in three medical doctors trained abroad. Indeed in some regions overseas doctors comprise up to 50% of all junior doctors (George et al., 2007). In Ireland, the percentage is quite similar. The corresponding percentage was 30.1% in 2007. The Nordic countries (Norway, Finland, and Denmark) have also a significant number of foreign trained doctors. For instance, the corresponding percentages were 10.9 % for Denmark and 7.2 % for Finland in 2005. In Norway, the proportion of foreign doctors is estimated about 15.6%. Compared to countries with similar size, such as France (5.8%), and Italy, the UK has almost eight times as many practicing doctors who were trained abroad (Dussault et al., 2009). Switzerland has also a high proportion of foreign trained doctors and is estimated about 18.8% in 2005. Belgium, Portugal, Austria, and Spain have high levels of foreign trained doctors raging from 11 % to 18%. Turkey, Estonia and Slovakia have a very low proportion of foreign medical doctors ranging from 0.02 to 0.7 %.

UK recruits health workers from the Philippines, African countries (especially South Africa), India, Pakistan, Australia, New Zealand, and it exports mainly to Australia, Canada, and other high income English speaking countries (Watkins, 2005). According to the General Medical Council (GMC)[67] and using data from registered doctors, the countries of origin with the largest proportion of registered doctors are India (10.8%), Pakistan (3.4%), and South Africa (2.5%) (see, GMC website)[68]. In Germany, almost about 30% foreign medical doctors come from third countries in Asia, Africa, America,

[67] All doctors working in the United Kingdom have to be registered with the General Medical council (GMC) The GMC records the place where initial qualification was obtained and provides some information

[68] Available at http://www.gmc-uk.org/doctors/register/search_stats.asp

Australia and Oceania, and other countries. In France, 36% of foreign medical doctors in 2009 came from Algeria, Morocco, and Tunisia. Finland also receives a high proportion of medical doctors from the Russian Federation with about 70-80 new registrations per year over the period 2004-2008. Austria has a small share of foreign medical doctors coming from Iran, Syria and Egypt. In Belgium, some medical doctors from Congo (53) and Morocco (91) undertook part of their specialization in Belgium.

In terms of stock, the WHO also reports that the number of foreign trained doctors in some Western European countries increased considerably over the last 30 years. In particular, between 1970 and 2005, for instance, the stock of such professionals rose from 1% to 6% of the total in France, Netherlands, from 3 to 11 % in Denmark, from 1% to 4% in Portugal, and from 26% to 33% in the United Kingdom. The proportion of foreign trained doctors in Germany and Sweden remained stable between 1970 and 2005 reaching the level of 5% (WHO Europe, 2007). No register data on medical doctors were available for Romania, Serbia, and Lithuania. As proxy variable, data on working permits for foreign medical doctors in Lithuania indicates a small number of foreign health professionals.

The OECD also reports the proportion of doctors that were working in OECD countries in 2000. Data suggests that 11.3 % British doctors were working in OECD countries. Luxembourg has the highest expatriation rate[69] with 31% doctors working in OECD countries. Ireland has also a high proportion of doctors working in OECD countries in particular with a expatriation rate of 27% (OECD, 2007). For instance, countries such as Italy, France has the lowest expatriation rate in European countries with 1.7 and 2% doctors working in OECD countries, respectively.

Finally, there are also specific flows between regions and countries in terms of flows of health workers. For instance, Latin America is one of the main providers of health professionals to some European countries, particularly, Spain (with 55% foreign born doctors in 2000) (OECD, 2007). In 2008, a total of 7706 of the 8282 foreign diplomas recognized were from outside the EU. Also, flows of health workers from North Africa (about half of foreign born doctors) are mainly to France.

[69] The expatriation rate is computed as follows: the number of foreign born doctors working in OECD countries born in country i; Yi = number of doctors working in country i; emigration rate = Xi/(Xi+Yi).

In regards to the mobility of European doctors (outflows), a World Health Organization (WHO) report published in 2009 (Dussault et al., 2009) reports that in New Zealand, 46% of all foreign trained doctors in 2006 were from Europe. The primary suppliers were the UK (2,634) and Ireland (151). Hassel et al. (2008) report that 6-9% of British-trained doctors were working outside the Britain. Also, in Canada, European doctors accounted for 38% of all foreign trained doctors in 2005, mainly from UK (2,164), Ireland (1,115) and France (422). In the United States, foreign doctors trained in the EU account for 18% of all foreign doctors belonging to the American Medical Association (AMA) in 2006. Italy (4,980), Spain (4,570), Germany (4,462) and UK (4,358) were the main suppliers of doctors to the United States. Finally, in South Africa, half of the immigration is coming from Europe. This latter result is driven by the flows from the UK which represented 1321 doctors in 2004 and it is classified as the biggest migration to South Africa.

Within the EU, Albanian doctors tent to immigrate Italy. Czech doctors go to the United Kingdom (Dussault et al., 2009). By far the most popular destination of Polish doctors was United Kingdom (1,633 doctors). Substantial levels of migration of Polish doctors were also registered over the period 2004-2007 in Sweden (417), Germany (417), Ireland (185), and Denmark (139) (Leniowska, 2006). Norwegian and Swedish doctors choose to migrate mainly to Denmark. Denmark also receives doctors from Poland, Russia, and Germany. The small numbers of doctors who emigrate from Armenia tend to go to the United Kingdom. Austrian physicians prefer German. Between 1988 and 2007, the number of Austrian medical doctors on the German registry increased from 260 to 1613. Between 2000 and 2008, the annual outflows of German medical doctors almost tripled, mostly to Switzerland, Austria, the United States and United Kingdom. For instance, in 2006, a total of 1,006 doctors moved to these countries. While Only 264 doctors moved to United Kingdom and Scandinavian countries in that year (Kopetsch, 2009). Italian doctors prefer the United Kingdom and Germany. In Belgium, before 2004, the inflow came from neighboring countries (France, Netherlands, and Germany) and to a lesser extent from Spain and Italy. After 2004, the largest group of immigrants comes from the Eastern part of the EU (Poland and Romania) (see, Stordeur and Léonard, 2010.). About quarter of qualified Spanish doctors work abroad with Portugal and UK the most preferred locations (Villanueva, 2008). A significant number of Hungarian doctors are

also practicing abroad, mainly in the UK, USA, Germany and Austria. Swedish doctors are practicing in Norway, and the US.

I.3.3 Quantifying the impact of the EU enlargement

In Europe, the accession of more countries to the European Union in 2004 and 2007 increased the scope for mobility among health workers and raised additional issues within the European context. In particular, ten new Member states were added in 2004, and two in 2007. Some countries, particularly those located in the eastern part of the region, are concerned about the outflows of health workers as a result from accession or that might also increase as they are part of a larger market for mobility of health professionals. In fact, this enlargement extended the European labor market for health professionals. The portability of health professional qualifications was guaranteed by the European treaties, establishing a free movement area. This facilitated the recognition of diplomas for medical doctors, nurses, dentists and other health workers. Enlargement also provided new incentives to work elsewhere due to lower salary levels in the accession countries.

The economics literature attempts to predict future migration flows from the accession EU countries based on econometric models using as input past immigration flows from countries other than ECE countries (for example, Boeri and Brücker, 2000; Fertig, 2001; Bauer and Zimmermann, 1999). The theoretical bases for the empirical specification are the economic arguments that relate migration to differences in returns to human capital and costs of migration (for instance, Harris and Todaro, 1970). Boeri and Brücker (2000) use their model to predict migration flows from the CEECs[70], Bulgaria, Romania, to Germany. They take the distribution of immigrants from the CEEC-10 to the European Union in 1998 and use it to extrapolate their predictions. They assume that the relative number of migrants going to each European country is going to remain to the same level as in 1998 and they forecast future migration flows to the whole EU-15 from the CEEC-10. Fertig (2001) only predicts the number of potential migrants from the CEEC-10 to Germany. Bauer and Zimmermann (1999) predict the percentage of the population in certain CEECs which will migrate to the EU.

[70] The CEECs countries are Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia. CEECs-10 is the CEECs plus Bulgaria and Romania.

The general conclusions of these three studies seem to be similar, since all of them make quite low predictions. According to the reported figures, between 70,000 and 260,000 immigrants per year would migrate to the EU-15 countries after the enlargement.

Also, the impact of accession on migratory flows of health workers is difficult to assess with accuracy. There is no a comprehensive analysis of mobility trends during the course of enlargement (OECD, 2008; Wiskow, 2006). The general impression is the outflows from some of the 2004 accession states have not been as high as anticipated by policy makers in these countries. For instance, a WHO report published in 2006, based on country case studies noted that whilst there were some indications of increased out migration of health professionals from Poland, Lithuania, and Estonia, the number were not as large as had been anticipated, perhaps because the surveys at the time had overestimated (Buchan and Perfilieva, 2006). Similarly, Wiskow (2006) come up with the same conclusions for Romania, Bulgaria Serbia and Croatia. Gerlinger and Schmucker (2007) conclude that after the EU expansion in 2004, the immigration of health workers increased but not as one expected. Lésniowska (2006) indicates that the accession of Poland to the EU had a huge impact on the migration process for medical doctors. This is most notable in UK where prior to the accession, there were 335 Polish doctors registered compared with 1,968 by 2007. Indeed some authors argue that in some areas of medical specialization the number of active physicians fell by almost 10 %, already creating shortages on peripheral and poorer regions of Poland. The number of doctors employed in Poland decreased by more than 100,000 over the period 2003-2006.

The number of medical doctors from the new Member states in destination countries such as Austria, Belgium, France, Finland and Italy increased modestly around 2004 and 2007. For instance, France registered a considerable increase in the numbers of Romanian medical doctors from 174 in 2007 to 1160 in 2009. UK has been also an important destination, attracting an increasing number of doctors from Poland, but also from Hungary, Romania, Slovakia, or Lithuania.

Finally, reports on other countries reach the same conclusions. In Ireland, the number of EU8 nationals employed in the health sector doubled between September 2004 and 2005 from 700 to about 1300. In Sweden, the number of authorizations granted to EU doctors rose from 230 in 2003 to 740 in 2004. In the UK, between May 2004 and December

2005, 530 hospital doctors, 340 dental practitioners, 950 nurses and 410 nursing auxiliaries and assistants were registered in the Worker Registration Scheme as coming from the new EU member states (Dumont and Zurn, 2007). García Perez et al. (2007) point out that according to the information available for emigration in recent years does not indicate an effect of the EU enlargement in the exodous of doctors from new member states to Norway, France or Germany.

We can also measure outflows of health professionals based on the intention to leave which was not as large as anticipated before accession. Outflows have not exceeded the 3% of domestic workforce. Although this intention to leave data should be interpreted with care and might also differ greatly from the actual outflows.

The latest WHO report shows that net winners of the enlargement have been predominantly those in the EU 15. For instance, France experienced a higher increase in the number of doctors coming from Romania. Spain and also the United Kingdom report important increases in the inflows of doctors from Poland and Romania.

The main effect of the enlargement was to reinforce the inflows from Eastern and Central EU member states towards western parts of the EU. Nevertheless, it is very soon to draw conclusions on the effects of EU enlargement. Recent data from Estonia, Hungary (for the years 2009 and 2010) reveal a new increase in outflows due to the economic recession.

I.3.4 Motives to immigrate: Pull and push factors

The motives for migrating are often characterized as "push" and "pull factors". Buchan et al. (2003) summarizes some of the possible main push and pull factors related to health workers (see Table 2).

Table I.3.4.1: Main "pull" and "push" factors in migration and international recruitment of health workers

Push factors	**Pull factors**
Low pay	Higher pay
Poor working conditions	Opportunities for remittances
Lack of resources	Better working conditions
Limited career opportunities	Career opportunities
Limited educational opportunities	Better resourced health systems
	Provision of post basic education

Specific factors	
Impact of HIV/AIDS	Political stability
Economic instability	Travel opportunities
Unstable work environment	Aid work

One of the main motivations to migrate is income. Some surveys reveal that income was found to be one of the key motivations for health professionals in Estonia, Poland, Romania, and Slovakia. For instance, wage differentials motivate Romanian health professionals to work up in countries where they can earn up to three times more. Also, outflows of medical doctors to Spain dropped in Spain in the mid and late 200s when salary levels rose.

Gathering data on remuneration levels is quite difficult because countries collect data based on different sources covering different categories of physicians, and often do not include all income sources. Data on remuneration refers to GPs. The remuneration of GPs ranges from 1.4 times the average wage of all workers in Hungary, to 4.2 times in UK. In all countries, the remuneration of GPs is lower than that of specialists (OECD, 2009). The other most cited motivation is the working conditions, covering elements such as the working environment, terms of employment, working relations. For instance, better working hours is one of the main motivations for Austrian doctors to move to Germany. In 1990s, job insecurity and temporary contracts drove Spanish health professionals to search for a job in Portugal.

The latest report about EU (WHO, 2011) indicates that salaries and working conditions were expected to attract medical doctors to some European countries. Nevertheless, these inflows were lower than one might expect due to labor market restrictions in several EU 15 member states. This report also mentions that as an important incentive to migrate is a perception of better salaries and opportunities.

Lastly, the possibilities of professional and career advancement are one of the key motivations for Finnish doctors to work abroad. Austrian doctors are attracted to Germany for the absence of waiting times for training places.

I.3.5 Policy and regulatory interventions

This section describes the regulations of medical doctors, international recruitment policies, and cross border frameworks (bilateral agreements).

Within the EU, responsibility for licensing/authorization for independent medical practice generally lies with the Ministry of Health and only a few countries the licensing lie with an independent professional body. In many countries, while the licensed is issued under the Minister's signature, membership or registration with an independent professional Chamber, Order, College or Council is an additional precondition for practice as a doctor, and compulsory membership with these bodies is imposed by laws as a condition to practice. In some countries, (Austria, France, Ireland, Slovakia, and United Kingdom), licensing/authorization is directly responsibility of totally independent chamber (See Table I.3.5.1). Only in UK and Ireland, the Councils are also responsible for the supervision of all medical education.

Table I.3.5.1: Licenses, institutions and registrations in Europe

	Basic license				
Country	**Institution**				**Registration**
	Ministry of Health or Education	**Delegation Dependent body**	**Delegation independent body**	**Chambre/order**	**Required**
Albania	X			X[1]	X**
Armenia	X				
Austria			X	X	X*
Azerbaijan	X				X
Belgium	X			X	X* (A)
Bulgaria		X (1)			X*
Croatia			X	X	X
Czech Republic			X	X(2)	X
Denmark		X(3)			
Finland		X(3)			X(B)
France				X	X
Georgia	X	X(4)	X(3)		
Germany	X*				X*
Greece	X*				X*
Hungary	X				X
Iceland	X				
Ireland				X	
Italy			X	X	X*
Kazakhstan					
Kyrgzystan					
Latvia			X	X	
Lithuania		X(6)			
Luxembourg					
Macedonia			X	X	
Malta			X(7)	X	
Netherlands					
Norway		X(8)		X(9)	
Poland				X	X*

Portugal			X	X	
Romania			X	X	X
Russian Fed.			X		
Slovakia				X	
Slovenia			X	X	
Spain					X*
Sweden		X(3)			
Switzerland		X+X*			
Turkey					
United Kingdom				X	X

Source: Rowe and García Barbero (2005). Notes: (1) Regional Health Care Center; (2) Partly to the Postgraduate medical training institute; (3) National Board of Health; Medical Affairs; (4) State Medical Academy; (5) Supreme Licensing Authority; (6) State Health Care Accreditation Agency; (7) President; (8) Norwegian Registration authority for health personnel; (9) Office of Public Health

I.3.6 International and domestic recruitment policies

International recruitment policies aim to attract foreign health workers either to meet short falls or to complement the skills of the existing workforce. Self sufficiency policies aim to meet country's demand for health personnel. Recruitment policies have been implemented by UK, Slovakia and Slovenia. The UK adopted an international recruitment policy in 1998 to fill in the gaps in the National Health Service (NHS) but move to self-sufficiency policy in 2006.

Slovakia adopted a self sufficiency policy in 2006, aiming to give health professionals better remuneration, working conditions and social consideration.

Bilateral agreements

Cross borders frameworks are used to steer and manage health professional mobility. They can be unilateral, bilateral or multilateral, and may be led by national government or local health care institutions. Bilateral agreements are the most commonly used cross border framework. They can be used to improve the mobility of international health workers, notably if they include some clauses whereby a recipient country agrees to underwrite the costs of training additional staff; o recruit surplus staff in source countries or recruit staff for a fixed period only, prior to their returning to the source country (OECD, 2008). The basic idea behind is that if there are countries with surplus or shortages of health professionals, international immigration can provide efficiency gains at global as well as individual level. If there is no surplus, international migration would still generate potential gains for the receiving country which faces to recruitment difficulties and the individual. In some cases, the emigration of high skilled workers might also guarantee the continuity of health services in the host country. In this context,

there might be concerns for the receiver country also about the quality of care in host countries. They might be due to potential differential in doctors' skills and experience and also the suitability to a new cultural environment.

France has three types of bilateral agreements with at least 10 countries, the majority of which are in northern or sub- Saharan Africa. For instance, the UK has developed bilateral agreements with China, Spain, Philippines, and India for the recruitment of health professionals. There is also an agreement with South Africa for reciprocal education exchange of health workers. Indeed, UK introduced a code of conduct for international recruitment from countries with workforce shortages in 2001. Switzerland has also an agreement with Canada to facilitate mobility of health care workers. Spain has also signed agreements with other European countries to send nurses (France, and UK) as it has a surplus of nurses. Germany has also signed agreements with ECE countries for the recruitment of foreign nurses. In general, we can distinguish four types of bilateral agreements: (1) Agreements which limit or exclude recruitment from countries with workforce shortages (for example, as that use in the UK), (2) Those that facilitate mobility of health professionals by establishing mutual recognition of diplomas. Thus, France has agreements with countries in north and central Africa, Monaco and Switzerland. (3) Those who promote active recruitment; for instance the UK between 2001 and 2005 signed agreements for the recruitment of medical doctors from Spain, Italy, Germany, and Austria (4) those that allowed temporary opening of labour markets to accession countries until that the enlargement was finalized and full mobility established such as the agreements between Norway and Hungary, and the UK and Poland. The above elements can be related to the situation of immigration in European Countries as this is summarized in table I.3.6.1.

Table I.3.6.1: Summary of immigration policies by country as introduced in the WHO (2011) report

Belgium	It has a specific health workforce planning police since 1996, when the Committee for Medical Supply Planning was established to advise the federal authorities on a quota system. The *numerus clausus* system was introduced in order to limit the number of graduates with access to the practice of medicine and dentistry. Quotas set the maximum number of graduates allowed to start general practitioner, specialist and dentistry training each year. For 2008– 2011, the quota allows 757 medical graduates to pursue general practitioner or specialist training. Apparently, Romanian doctors appear to be the most important group among the new EU members who moved to Belgium to work. Belgian data shows that France, and UK are the most important destinations for Belgian doctors.
Finland	About 840 Finnish medical doctors worked abroad in 2006. The outflows of medical doctors have decreased over time. The most important destinations were Sweden, and the United States. The most important source countries are: Russia, Estonia, Sweden, and Germany.
France	The stock of foreign medical doctors registered with the CNOM on 1 January 2010 was 10165. This represents around 4.7% of the medical workforce. Data as at 1 January 2009 show that 47% of foreign medical doctors held a degree from outside the EU, mainly from North Africa (Algeria 10.3%, Morocco 7.8%, Tunisia 4.8% (CNOM

	2009). However, inflows from the Maghreb have been decreasing, falling from 45.6% of new registrants in 1999 to 12.1% in 2010 (CNOM 2010). Immigration from Romania has increased considerably since the country's accession to the EU – there were 174 registered Romanian doctors in 2007, 819 in 2008 and 1160 as at 1 January 2009 (CNOM 2009). In 2009, Romanians represented 73% of medical doctors from the new EU countries registered by the CNOM. The mobility of health professionals from non EU countries is not encouraged. France has signed bilateral agreements with Monaco, Morocco, Tunisia, and state agreement with some African countries – the Central African Republic, Chad, the Congo, Gabon, Mali and Togo. Medical doctors from the countries listed can practise in France if they have a French medical degree or one title mentioned (see Article L431-1 of the CSP (2011).
Germany	The total number and the annual inflows of foreign-national medical doctors registered in Germany are recorded by the regional chambers of physicians. At the end of 2008 there were 21 784 medical doctors of foreign nationality in Germany, approximately 5.2% of the total number of registered medical doctors, and 18 105 active (practising) foreign medical doctors, around 5.7% of all active medical doctors in the country. The main source countries for medical doctors in 2008 are: Austria (1802), Greece (1708), Russia (1685), Poland (1428), and Iran (1092). In 2008, a total of 3065 medical doctors who originally practised in Germany, moved abroad, about 67 % held German nationality. This represents around a 10% increase in the total number of German medical doctors are leaving the country. Importantly, there is no information on the number of medical doctors who returned to Germany after practicing, as return immigration is not recorded.
Italy	The actual number of foreign medical doctors is 14 548 that is equivalent around the 5% of the medical workforce. Mainly they come from Germany, Switzerland, Iran, France Venezuela, and Argentina. OECD (2010) data show slightly more – 14 747 foreign-national medical doctors in Italy in 2008, representing 3.7% of the medical workforce. Data from the inflows of foreign come from the Ministry of Health. In particular, 1310 holders of foreign diplomas were recognized to work as medical doctors in Italy. There is a numerus clausus introduced in 1994. The government limits the number of specialist doctors to be trained at 8848 in the 2009-2010 academic year and the number of graduate posts in medicine or surgery to 9527 in 2010-2011. There is no a clear immigration policy related to the immigration of health professionals. Foreign health professionals wishing to exercise a health profession must register with the relevant professional order and pass an oral Italian language exam.
Spain	There have not been significant inflows from the accession countries. The only exception was Poland, and Romania. It should be noticed that there was a surplus of doctors which began in the 1980s to a shortage that started around 2003. It is important the presence of foreign doctors in specialist training, particularly from Latin America. This is reflected in the increasing number of foreign candidates attending the medical residence exam (MIR). For instance, in 2007, foreign candidates gained 16% of the MIR places. The main source countries are: Peru, Argentina, Colombia and Venezuela. Although there is no data available, there is a significant number of foreign students in Spanish universities**.**
Lithuania	The accession to the EU did not produce the anticipated outflows and proportions of health professionals leaving the country still remain low. The foreign doctors come from third countries such as China, Israel, Pakistan, Lebanon, and Russia among others. The main destination country for Lithuanian medical doctors, nurses and dentists proved to be the UK, followed by Scandinavian countries. In terms of stocks, the number of medical doctors per 100,000 populations is 407.8 in 2007 which is higher than the European average (315.22).
Slovakia	The most popular destinations for Slovakian health professionals were Austria, the Czech Republic, the United Kingdom, and Germany**.** In terms of inflows, the foreign health professionals comprises less than 1% of the total number of medical doctors, nurses, dentists, and midwives. In 2007, there were only 125 foreign medical doctors. The most important countries of origin of foreign doctors were Czech Republic (27), followed by Ukraine (19). Between 2000 and 2006, the number of Slovak nationals working abroad increased from 49,300 to 168,800. Slovakia was self-sufficient before 1989 but now is facing to significant outflows of health professionals.Currently; there is no numerus clausus in place. One of the main problems of attracting foreign student is that medical education is often not compatible with the EU's minimum educational standards.
Serbia	The report also includes as special case: Serbia. Serbia has been an important provider of health professionals over the last 50 years. It is estimated that around 10,000 Serbian health professionals are working abroad (Statistical Office of the Republic of Serbia, 2000). The main destination European countries for Serbian health professionals are Germany (28%) and Switzerland (15%) (see Djikanovich, 2006), but now Slovenia is becoming more popular after its accession to the EU. The main concern is the overproduction of health professionals, and therefore high unemployment rates among medical doctors. These factors suggest the potential for increasing outflows rates. Young medical doctors are looking for better opportunities abroad, leaving behind an increasingly age working force. Medical doctors are also employed in lower professional positions in the recipient countries. It should be noted that an explicit policy for human resources in the health sector was introduced in 2002 when the government implemented the Health Policy of Serbia.

Source: Who (2011): Editors Matthias Wismar, Claudia B. Maier, Irene A. Glinos, Gilles Dussault & Josep Figueras, editors (2011): Health professional mobility and health systems. Evidence from 17 European countries, 2011, xxxii + 597 pages
ISBN 978 92 890 0247 9.

I.3.7 The role of medical education

The demography of health professionals can be regulated through the entry to medical schools with the use of "numerus clausus". According to OECD statistics, there are differences across countries over medical school enrolment. Some countries exercise some form of control over medical school intakes (OECD, 2008). These controls take the form of a "numerus clausus"[71] (see Table 5). In fact, countries have modified these caps at different times. France, Denmark, Italy, Germany and Netherlands, Portugal and more recently Belgium have adopted a numerous clausus system. Other countries, such as Ireland, leave some discretion.

Countries with a higher graduation rate for instance such as Denmark, Austria, Greece, and Ireland, more liberal policy have adopted a relaxed student intake policy (OECD, 2009). Portugal has the lowest graduation rate among OECD countries. Denmark and Italy have graduation rates above the OECD average (OECD, 2008). There is also variation regarding the duration of medical studies.

Regarding ECE countries, for instance, Romania has not restrictions on the entry of medical schools (numerus clausus). Each university decides for itself the number of students to be admitted to study medicine, depending on the available funding (Vladescu et al., 2008). In Estonia, due to an oversupply of doctors, the national government decided to reduce the number of students admitted from 200 per year in the 1980s to 70 in 1995. Nevertheless, since 2004, the government has increase the admission level to 140 per year (Koppel et al., 2008)

A high proportion of the international immigration consists of students. In fact, students mobility is some kind of temporal immigration, though in many cases becomes permanent. The OECD estimated that around three million of students in higher education are enrolled outside the country of citizenship. The exact number of students outside is difficult to estimate. Data on international student flows can be collected from the OECD. Australia, France, Germany, UK, and United States receive more than 50% of all foreign students worldwide. In particular, the USA received almost 19% of all foreign students worldwide, followed by UK (10%), Germany (7), France (7) and Australia (7). Also, significant numbers of foreign students were enrolled in Canada (6%), Spain 82%),

[71] It is a policy instrument which countries have used by changing the cap at different times.

Italy (2%) and Russia (4) in 2008 (OECD, 2010). There is also an internal mobility of students. Thus, Czech students prefer as main destination Slovak Republic (26%). In some European countries, the proportion of students enrolled in the field of "Health and Welfare" is higher in Belgium (about 40% in 2004), followed by Denmark (21%), and the Netherlands (14%) (Dummont and Zurn, 2007).

More and more students cross the border. This is particularly true within the EU. The EU supports the Erasmus program and Bologna process. The latter favors international mobility of students. The Bologna process and the mobility of health professionals within the EU is much easier than before. In the case of medical field, where are a high number of French and German students failing the entrance test in their country of origin, they find a substitute, for example, in the French speaking part of Belgium or in Austria and return home after obtaining their degree. In this case, France and Germany free ride their neighbor. The EU aims to reach a benchmark of 20% of all graduating students with a study or training period abroad by 2020.

Gérard (2010), based on OECD and UNESCO figures, provides some numbers about the mobility of students within the EU. He provides information on the proportion of foreign students from EU member states in local institutions. Furthermore, he also includes information on the balance in and out flows of students within the EU. Belgium, Austria, and UK are the countries with the largest proportion of foreign students. The percentages were 6.5, 8.1 and 4 % respectively. The lowest proportions of foreign students are found in Poland and Greece with 0.04 % respectively (for more details, see Gérard and Vanderberghe, 2007).

Recognition is another importance part of the Bologna process. Davies (2010) has also pointed out the need for the Bologna process to speed up the transparency and ease recognition. The main objective of recognition is to make possible for learners to use their qualifications from one education system to another education system without losing the real value of these qualifications. This is facilitated with the European Credit Transfer System (ECTS) and DS system. Nevertheless, in Europe, the introduction of a two cycle structure has found a lot resistance. Indeed, this structure is seen as problematic and probably harmful to medical education and its quality, to the medical students, schools and professionals". Recall that the medical education is regulated under the

Directive No. 93/16/EEC stipulating that medical education in Europe consists of six years and 5.500 hours of structured schooling. It is also difficult to assess the impact of the Bologna model on medical education in Europe as its implementation is still ongoing.

Table I.3.7.1: Medical education in Europe

Country	Numerical limits apply to medical education	Remarks
Austria	No	Since 2003 Austria has one private medical school
Belgium	Yes since 1997	Government fixes the number of new accreditation to practice
Denmark	Since 1977	Government fixes the number of student places
France	Yes since 1971	A decree from the Prime Minister fixes the numerous clauses for the admission in the second year of undergraduate medical school
Germany	Yes	Study places are allocated by the Central Office for the Allocation of places in Higher Education according to a procedure established by the Federal Lander
Greece	Yes	The Ministry of Education determines the number of places in each medical school on the basis of available financial resources rather than to match demand and supply
Ireland	No	There are certain number of state funded places, but colleges have discretion to take in more students
Italy	Yes	The number of places for the degree in Medicine and Surgery is determined yearly by a decree of the Minister for Universities and Research
Netherlands	Yes	Universities have a "numerus fixus" for medical students which means that only a limited number of students are admitted. The great part of available places is assigned by lot.
Norway	Yes	
Spain	Yes	The Ministries of Health and Education and the National Conference of University Chairmen set the cap
Sweden	Yes	Medical school intake is controlled by the central government
Switzerland	Yes since 1998	Some cantons have introduced a numerus clausus
United Kingdom	Yes	Medical school intake is controlled by the government through the funding of university places

Source: OECD (2008) pp. 94-95. Own construction

I.3.8 The new economics of brain drain

The brain drain argument has induced several receiving countries to re think about the recruitment of skilled personal. Some European countries, for example, the UK is restricting the recruitment of health professionals from most developing countries. The NHS has applied new restrictions on recruitment of health professionals. But restricting the entry to the labour markets might also increase the proportion of informal immigrants into the economy. This is linked to the phenomenon of brain waste where skilled immigrants cannot use their human capital properly, often working on posts for unskilled staff. This is in contrast to the predictions of the new economics of brain drain. This

theory assumes perfect transferability of human capital across borders. Immigrants get jobs which correspond to their qualifications and they are paid according to the human capital embodied them. These administrative barriers might also increase the costs, imposing an artificial self-selection of migrants on the basis of income. At this respect, countries also need to coordinate emigration policies. So, stronger restrictions in one country may divert migrants to the less restrictive countries.

The new economics of brain drain also argue that the countries of origin my gain from the human capital fly in one way: the migration perspective increases the attractiveness of educational investments in the sending economy, thus facilitating the accumulation of human capital and higher growth. That is, migration encourages more people to acquire additional education, raising the stock of human capital which is beneficial for growth. The empirical evidence is not consistent with that theoretical prediction. Some authors have found that migration rates are negatively correlated with enrollment rates (for instance, Checchi et al., 2007).

The new economics of brain drain argue that some of the members of the Diaspora may return back to their country of origin, bringing social, physical, and human capital accumulated abroad. This might contribute to economic development (Stark et al., 1997).

The new economy of labour migration suggests that the migration decision is made jointly by the migrant and his family. It is a family decision rather than individual decision (Stark, 1991). One important element of this theory is the role of remittances that is absent in traditional migration theories. Remittances are mentioned as one of the positive effects of brain drain. These transfers in some cases represent a large proportion of the national income. It can be used as a potential channel to compensate origin countries for the economic loss due to migration. These funds increase household incomes, indirectly enhance local trade, and this might be partially injected into the health system. The empirical evidence suggests that remittances decreases with the increase in prosperity of the country of origin, and also remittances increase with the migration rate. The New Economy indicates that there is no evidence for a potential gain for the countries of origin due to higher remittance intensity as the share of high skilled migrant increases. Remittances are linked to unskilled workers. If high skilled migration

is mostly concentrated on developed countries, the intensity of remittances could even decrease.

I.3.9 Interventions to address brain drain

As economic development is the most effective way to retain and attract skilled labour, sending countries' policies to promote development are the best tools to achieve the objective. This can be combined with a number of migration specific policies for the receiving countries. Another strategy is to raise the domestic supply of health professionals. This would require to increase the capacity of faculties and schools, and to increase the number of training facilities as well as the specialist training slots. Destination countries could also work with source countries to establish mechanisms (based on positive incentives) to promote return migration. This return can be permanent or temporary. Promote the portability of educational achievements. For some reasons, the skilled immigrants cannot use their human capital properly. There might be problems with the recognition of the university diploma. This might also lead to occupy unskilled works. That is why is crucial to harmonize the educational systems. One proposal is to improve medical structure and thus making working in the health sector in developing countries more appealing. This can be done through foreign health assistance which is development aid targeted towards medical facilities. Moullan (2009) says that this works countries with lower levels of corruption.

Conclusion

This chapter placed emphasis on the migration flows and stocks in different countries of Europe. It also discussed the migration flows originating in MENA countries.

Different outcomes appear to be attained at this stage of this literature survey. They include the potential needs of EU of medical doctors besides the series of legal and professional constraints placed by EU and by countries. Besides that, the role of medical education in addition to the openness of trade in education and health services seems to provide promising avenues for the creation of new collaborative frameworks that may generate further win-win health proposals.

The data available suggest potential shortages of medical doctors in some European countries. Indeed, there is evidence that some countries are looking to fill in vacancies from either neighbouring countries or from further away. The demographic trends in many European countries, in particular, a growing elderly population, may increase health care services and this would encourage the potential inflows of medical doctors in the next years.

It is also crucial to assess the impact of health workforce mobility on national health systems. The negative impact of the out migration of health workers from some developing countries to developed countries was highlighted in the World Health Report 2006.

Three potential actions seem to be important.They include the need for the quality of data of flows and potential comparability across countries. Besides that, the inclusion of educationa policies (mainly those promoting mobility of students across Europe), is critical. Furthermore, educational programs can be considered as another type of migration which requires different types of policies. The last type of action relates to the enhancement of cooperation between EU countries and other countries to increase the welfare of all parties concerned.

Part II: New Economics of Migration of Medical Doctors from ECE & MENA with Focus on the Moroccan Case

This part focuses mainly on the promising theoretical and empirical features of the new economics of skilled labor and its applications to medical doctors from ECE and MENA economies. The first sub-part is precisely devoted to show the outcomes from the implementation of a new view on the perception of the emigration of medical doctors. The second sub-part introduces the case of the Moroccan economy with its prospects regarding medical doctors. It also provides the outcomes from a survey of medical doctors from Morocco where most of the findings and implications of the new economics approach to migration.

II.1 New Economics of Migration of Medical Doctors from MENA & ECE to the EU: Theoretical and Empirical Applications

This is a contribution to the new economics of skilled labor emigration that focuses on the mobility of physicians inside European Union from ECE and MENA countries. Economic models under risk neutrality and aversion are used. The findings show that the education could change significantly the results on the emigration benefits. Comparisons of theoretical and observed relative human capital per country averages are conducted. They ensured the statistical validity of the model used. The empirical results based on the available data on emigration by Docquier and Marfouk (2006 and 2008) and Bhargava, Docquier and Moullan (2010) allowed further use of the model to understand the current trends in the emigration of physicians and the border between brain gain and brain drain. The countries included in the study are all exhibiting brain gain under 1991-2004 emigration data. Each country is encouraged to anticipate the likely effects of this emigration on the economy with the increase of health demand, the domestic wages and the increase in education capacity for medical doctors.

In the context of globalization in general and of EU enlargement in particular, migration is one of the most important and sensitive aspect with a lot of implications on social, economical and demographical changes.

This chapter deals with the migration of physicians inside European Union. Economic models under risk neutrality and aversion are used. The model used in this paper is not different from the one developed in Driouchi, Baudassé, Boboc and Zouag (2009). The basic features of this model are from Stark et al., (2005). After the underlying assumptions, the cases of risk neutrality and aversion are introduced with their related comparative statistics.

It begins with a literature review of the main papers about the new economics of skilled labor emigration. Many authors analyzed these imbalances. In the countries when health care needs are often greater than in developed countries the workforce shortage seriously compromise the ability to deliver adequate and equitable health care to a large proportion of population. But, the new economics of skilled labor has identified potential gains that could benefit the source economy as emigration of skills can induce further quantitative and qualitative domestic training and graduation from domestic higher education systems. The overall net effects of the emigration and the domestic training and graduation is translated into a net effect that can be either "brain drain" or "brain gain" depending on the situation of each economy.

The chapter continues with description of the model developed in Driouchi, Baudassé, Boboc and Zouag (2009). The empirical results based on the available data on emigration by Docquier and Marfouk (2006 and 2008) and Bhargava, Docquier and Moullan (2010) allowed further use of the model to understand the current trends in the emigration of physicians and the border between brain gain and brain drain. The countries included in the study are all exhibiting brain gain under 1991-2004 emigration data. Each country is encouraged to anticipate the likely effects of this emigration on the economy with the increase of health demand, the domestic wages and the increase in education capacity for medical doctors.

II.1.1 Literature Review

Physician migration is a complex and multifaceted phenomenon. Imbalances in the production of physicians lead to workforce shortages and surpluses. Many authors analyzed these imbalances. In the countries when health care needs are often greater than in developed countries the workforce shortage seriously compromise the ability to deliver

adequate and equitable health care to a large proportion of population. In these countries the physician emigration could have important effects on donor countries (Norcini et al., 2005)

Authors such as Commander, Kangasniemi and Winters (2004) emphasized that early models found that emigration of skilled labor would be harmful through the impact on wages, employment, and fiscal costs. They also showed that more recent literature has argued that a beneficial "brain gain" takes place under the effects of educational externalities. Marchiori, Shen and Docquier (2010) imply that the movement of high skilled human capital from developing to developed countries can have many positive effects. Brain drain improves human capital through ex-ante motivations to be highly educated, creates positive externality on total factor productivity by helping technology diffusion from the receiving countries, decreases information risks and triggers more foreign direct investment inflows (Marchiori et al., 2010).

However, the empirical findings of Beine, Docquier and Özden (2009) suggest that education-based selection rules are likely to have moderate impact. Bhargava, Docquier and Moullan (2010) quantified the effects of physician emigration on human development indicators in developing countries. The model used suggests a positive effect of migration prospects on medical training but the magnitude of this effect is too small to generate a net "brain gain" in the medical sector. These authors underline also that stopping physician brain drain has a small impact on human development. De la Croix and Docquier (2010) explore the complementarities between highly skilled emigration and poverty in developing countries through a model with human-capital accumulation, highly skilled migration and productivity. Their results show that two countries sharing the same characteristics can exhibit different impacts on poverty. Camacho (2010) uses a model with an economy composed of two sectors and two regions while allowing for skilled migration. The solution path attained converges to a steady state that exhibits a distribution of skills between regions but with no evidence of symmetry. The new steady state obtained depends on technology, fixed costs, knowledge spillovers and transportation costs.

Lodigiani (2009) provides stylized facts on the magnitude and skill composition of migration and explores the main findings on "brain drain". It focuses also on diaspora

networks and on the major channels that foster economic development in source countries of emigration. Docquier and Rapoport (2009) contribute further to the literature through adding three case studies on the African medical brain drain, the exodus of European researchers to the United States, and the contribution of the Indian diaspora to the rise of the IT sector in India. The three cases are related to the "very upper tail of the skill and education distribution". Their effects on the source countries exhibit mixed results. These mixed types of results are also found in Beine, Docquier and Rapoport (2009).

Despite the increasing pressure of globalization and of the knowledge economy which promote labour migration, Fouarge and Ester (2008) find out that Europeans are not that willing to move to another country. Based on Eurobarometer Mobility Survey data (2005), only 5.4 per cent of the working-age population intends to move to another country within the next five years. Anyway, there are great disparities between countries, mostly between Eastern and Western countries. While family and other social relationships, as well as housing and local environment conditions, are important, Fouarge and Ester (2007a) and Bonin et al. (2008) show that employment-related factors, such as higher income, better working conditions, and opportunities of finding a suitable job are key migration motivators in Europe, and in the new members states in particular. Furthermore, Bonin et al. (2008) show that language and cultural barriers also play an important role.

In the new member states of EU, Blanchflower et al. (2007) show that the propensity to migrate is correlated with income per capita, unemployment rates, and life satisfaction. Unhappiness with their lives, dissatisfaction with their salaries and working conditions, small number of good jobs and employment insecurity are the key reasons for Eastern Europeans to migrate in the Western European countries (Blanchflower and Lawton, 2008)

But, the new economics of skilled labor has identified potential gains that could benefit the source economy as emigration of skills can induce further quantitative and qualitative domestic training and graduation from domestic higher education systems. The overall net effects of the emigration and the domestic training and graduation is translated into a net effect that can be either "brain drain" or "brain gain" depending on the situation of

each economy. This new type of literature has emerged following the contributions of Mountford (1997), Vidal (1998), Beine et al. (2003), Stark et al. (2005), Duc Thanh (2004) and M. Schiff (2005), among others.

Open economies with immigration are attractive since wages of skilled workers are higher that those prevailing in the source countries. According to Beine & al (2002), the human capital migration can be globally beneficial to the country of origin when the brain effect dominates the drain effect for the country of emigration.

Stark's theory (Stark et al., 2005) points to the fact that the prospect of migration may result in the formation of a socially desirable level of human capital. The expected higher returns to human capital in the destination country influence the decisions about the acquisition of skills in the country of origin (Stark, 2005).

However, the analysis of the behavior of skilled labor denotes some degree of aversion towards risk that is not really taken into consideration by the literature on skilled labor migration. So, the analysis of labor decisions under risk is important in the process of identifying the optimal human capital and the optimal emigration rates for skilled labor (Schechter, 2005; Schechter, 2006). Other authors emphasized the relationships between the levels of initial wealth, income and levels of risk aversion (Rabin, 2000; Rabin & Thaler, 2001; Chetty, 2003).

II.1.2 The Economic Model

The model used in this paper is not different from the one developed in Driouchi, Baudassé, Boboc and Zouag (2009). The basic features of this model are from Stark et al., (2005). After the underlying assumptions, the cases of risk neutrality and aversion are introduced with their related comparative statics.

1. Model Assumptions

Labor productivity in a given economy is represented by β. It is equivalent to private returns to labor, as in Stark et al (2005). In the context of this model, β takes values β_S in the source and β_D in the destination countries. The private returns in the destination countries are considered to be higher than those in the sending countries ($\beta_D > \beta_S$). It is

assumed here that emigration decisions are uniquely based on the levels of β that can be either β_D or β_S with respective probabilities m and $(1-m)$.

In this model, each emigrant (given the static nature of the model) seeks a level of education h (considered as an individual investment in human capital) under the linear cost function ch with c being the unit cost of education. Furthermore, the level of education h is valued through a production function $g(h) = ah^{\gamma}$ (the output of human capital) where $0 < \gamma < 1, g'(h) > 0, g''(h) < 0$ and a is the talent of individuals.

Each agent is consequently assumed to get (as a student) or to have the level of education h (after graduation) based on the maximization of an objective function $V(h) = \beta_S g(h) - ch$ in the absence of emigration (closed economy) and his expected utility in case of emigration (open economy). This latter option is the one considered in this paper where the model is accounting for risk neutrality and risk aversion.

2. Derivation of the theoretical decision rules under risk neutrality

Under the above assumptions, each individual in the economy is assumed to emigrate with probability m in order to achieve an overall net benefit in relation to the realization of the random variable β (β_D and β_S respectively with probabilities m and $(1-m)$).

This implies that the overall objective function in case of risk neutrality is given by the expected earnings related to this choice:

$$V(h) = m\beta_D g(h) + (1-m)\beta_S g(h) - ch$$

The necessary and sufficient conditions (given the concavity of $g(h)$) for a maximum V to hold are given by the optimal value of h:

$$h^* = \left[\frac{c}{\gamma a\left[m\left(\beta_D - \beta_S\right) + \beta_S\right]}\right]^{\frac{1}{\gamma-1}}$$

The aggregate stock of migrant skilled human capital is given by:

$$H = N\left[\frac{c}{\gamma a\left[m\left(\beta_D - \beta_S\right) + \beta_S\right]}\right]^{\frac{1}{\gamma-1}}$$ where N is the total population that is willing to emigrate.

The aggregate stock of human capital remaining in the country (non emigrant) is:

$$H_N = (1-m)N\left[\frac{c}{\gamma a\left[m\left(\beta_D-\beta_S\right)+\beta_S\right]}\right]^{\frac{1}{\gamma-1}} \quad (1)$$

Under absence of emigration (m=0), the stock of human capital in the country of origin is:

$$H_{N0} = N\left[\frac{c}{\gamma a\left[\beta_S\right]}\right]^{\frac{1}{\gamma-1}}$$

The relative domestic human capital remaining in the source country is:

$$\left(\frac{H_N}{H_{N0}}\right) = (1-m)\left[m\left(\beta_D/\beta_S - 1\right)+1\right]^{\frac{1}{1-\gamma}} \quad (2)$$

The following questions are related to the variations of the aggregate domestic relative human capital.

<u>Variations with respect to the emigration rate and optimal emigration</u>

Depending on the level of m, relative wages and gamma, the changes in the relative human capital relative to gamma can be positive or negative. For values of m higher than m*, the derivative is negative while positive below this value.

$$\partial\left(\frac{H_N}{H_{N0}}\right)/\partial m = \frac{1}{H_0}(\partial H_N/\partial m) = \frac{1}{H_0}(1-m)\left[m\left(\beta_D/\beta_S - 1\right)+1\right]^{\frac{1}{1-\gamma}}$$

As in (Appendix I, Demo 1, Demo 2 and Demo 3) the maximal emigration rate among other results is given by:

$$m_N^* = \frac{\left[\beta_D-(2-\gamma)\beta_S\right]}{(\beta_D-\beta_S)(2-\gamma)} = \frac{\left[(\beta_D/\beta_S)-(2-\gamma)\right]}{((\beta_D/\beta_S)-1)(2-\gamma)}$$

Again, m_N^* is a function of relative wages and of γ.

The relative human capital varies in the same sense with respect to relative wages.

$$\partial\left(\frac{H_N}{H_{N0}}\right)/\partial(\beta_D/\beta_S) = (1-m).m.(\frac{1}{1-\gamma})\left[m\left(\beta_D/\beta_S - 1\right)+1\right]^{\frac{\gamma}{1-\gamma}} > 0$$

It also varies following the direction of γ as:

$$\partial\left(\frac{H_N}{H_{N0}}\right)/\partial(\gamma) = (1-m).(1/(1-\gamma))^2 \ln\left[m\left(\beta_D/\beta_S - 1\right)+1\right]\left[m\left(\beta_D/\beta_S - 1\right)+1\right]^{\frac{1}{1-\gamma}} > 0$$

Increases (respectively decreases) in γ leads to increases (decreases) in the relative net human capital gains.

$$\partial m_N^* / \partial(\beta_D/\beta_S) = \partial \frac{\left[(\beta_D/\beta_S)-(2-\gamma)\right]}{((\beta_D/\beta_S)-1))(2-\gamma)} / \partial(\beta_D/\beta_S)$$

The optimal emigration rate increases (decreases respectively) with increases (decreases) of the relative wages (wage in destination relative to that at the origin). The optimal rate of emigration changes also in the same direction with changes in γ.

$$\partial m_N^* / \partial(\beta_D/\beta_S) = \frac{\left[(-(2-\gamma)+(2-\gamma)^2\right]}{((\beta_D/\beta_S)-1)(2-\gamma))^2} > 0$$

$$\partial m_N^* / \partial(\gamma) = \frac{(\beta_D/\beta_S)((\beta_D/\beta_S)-1)}{((\beta_D/\beta_S)-1)(2-\gamma))^2} > 0$$

<u>The level of m that equates H_N with H_0</u>

This level is given by:

$$\left(\frac{H_N}{H_{N0}}\right) = (1-m)\left[m\left(\beta_D/\beta_S - 1\right)+1\right]^{\frac{1}{1-\gamma}} = 1$$

This is achieved with m=0, with $H_N = H_0$ and with m=m* because of the concavity of H_N.

This implies that m** is given by the second zero of the following equation:

$$(1/(1-m)^{(1-\gamma)}) = m\left(\beta_D/\beta_S - 1\right)+1$$

The values of m** indicate how the economy enters the net brain drain phase. The higher is m**, the better off is the economy as the brain drain occurs at higher probabilities of emigration. Lower m** is an indication of higher brain drain and then the sensitiveness of the economy to the loss.

These trends are discussed below under different simulations of the relative wages and the schooling yield γ (Figure II.1.1).

m** increases with relative wages meaning that the relative human capital starts to be less than the domestic human capital while at lower relative wages, m** is lower. The value of m** is a function of relative wages and is higher under higher gammas. This implies that the changes from lower values to higher values of gammas meaning from lower to higher valuation of education, m** gets higher. It attains the level 1 under gamma = 0.8 or the highest level of valuation of education. Lower m** is expected under lower gamma.

Figure II.1.1: m for different γ and relative wages**

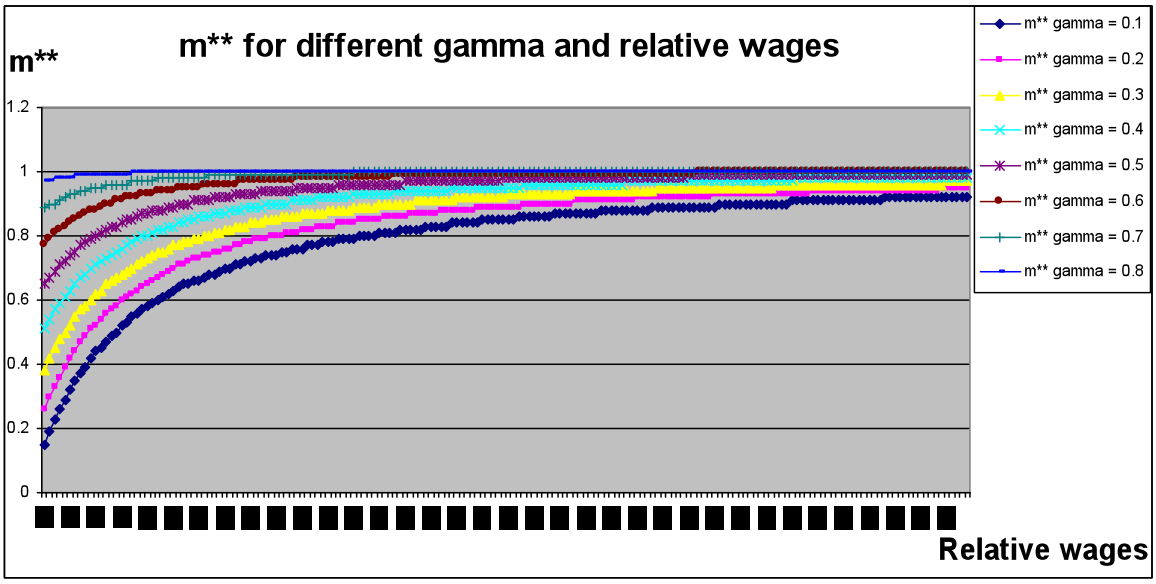
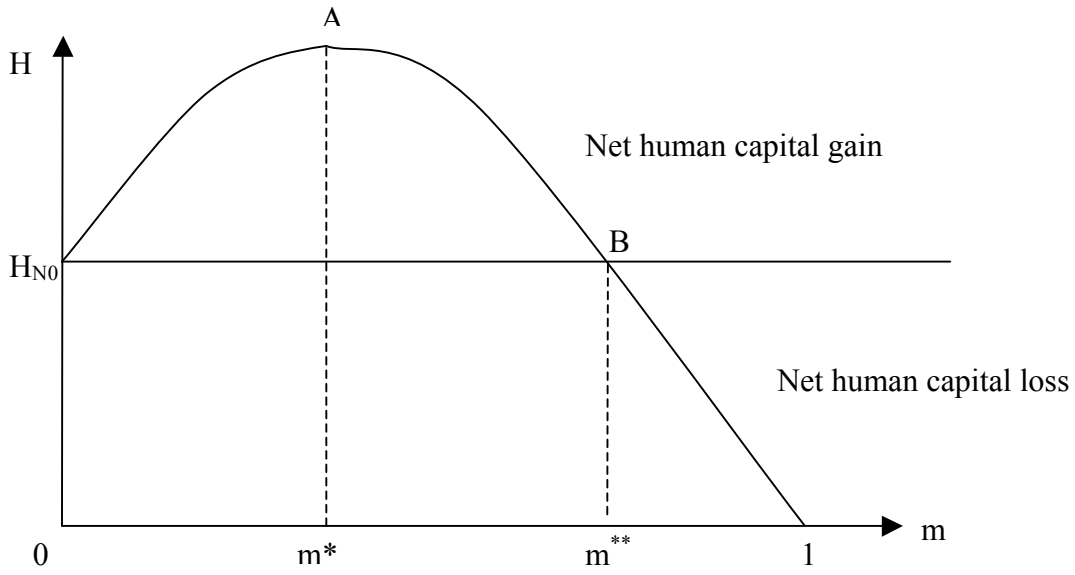


Figure II.1.2: The shape of H as a function of m



3. Emigration under Risk Aversion

In case of risk aversion, a constant relative risk aversion (CRRA) function is used (Harrison & al, 2005) as $U(x) = \frac{x^{1-r}}{1-r}$ or $U(x) = \frac{x^{\alpha}}{\alpha}$, ($\alpha \in]0,1]$), where $\alpha = 1 - r$ and r is the CRRA coefficient.

Under the above assumptions, the objective function is formulated as:

$V(h) = m.U(\beta_D g(h)) + (1-m).U(\beta_S g(h)) - ch$ or:

$$V(h) = \frac{m}{\alpha}\beta_D^{\alpha} a^{\alpha} h^{\gamma\alpha} + \frac{(1-m)}{\alpha}\beta_S^{\alpha} a^{\alpha} h^{\gamma\alpha} - ch$$

Given the concavity of $V(h)$, the necessary and sufficient condition for a maximum leads to the maximal level of education to be:

$$h^* = \left[\frac{c}{\gamma a^{\alpha}\left[m(\beta_D^{\alpha} - \beta_S^{\alpha}) + \beta_S^{\alpha}\right]}\right]^{\frac{1}{\gamma\alpha - 1}} \qquad (3)$$

The aggregate stock of skilled human capital in case of risk aversion under emigration is given by:

$$H_T = N.h^* = N\left[\frac{c}{\gamma a^{\alpha}\left[m(\beta_D^{\alpha}-\beta_S^{\alpha})+\beta_S^{\alpha}\right]}\right]^{\frac{1}{\gamma\alpha-1}}$$

where N is the total labor force in the economy.

The human capital remaining in the source economy, in case of emigration under risk aversion is given by:

$H_R = (1-m)H_T$ Or:

$$H_R = (1-m)N\left[\frac{c}{\gamma a^{\alpha}\left[m(\beta_D^{\alpha}-\beta_S^{\alpha})+\beta_S^{\alpha}\right]}\right]^{\frac{1}{\gamma\alpha-1}} \quad (4)$$

$$H_{R0} = N\left[\frac{c}{\gamma a^{\alpha}\left[\beta_S^{\alpha}\right]}\right]^{\frac{1}{\gamma\alpha-1}}$$

$$H_R / H_{R0} = (1-m)\left[m((\beta_D{}^{\alpha}/\beta_S{}^{\alpha})-1)+1)\right]^{(1/(1-\alpha\gamma))} \quad (5)$$

3.1. Changes in Optimal Human Capital

The variations of the domestic human capital formation H_R in relation to m are considered also important to be taken into account. These variations are analyzed using the first and second derivatives of H_R that are respectively given by (Appendix, Demo 2):

$$\frac{\partial H_R}{\partial m} = H_R.\frac{(1-m)(\beta_D^{\alpha}-\beta_S^{\alpha})-(1-\gamma\alpha)\left[m(\beta_D^{\alpha}-\beta_S^{\alpha})+\beta_S^{\alpha}\right]}{(1-m)(1-\gamma\alpha)\left[m(\beta_D^{\alpha}-\beta_S^{\alpha})+\beta_S^{\alpha}\right]}$$

$$\frac{\partial^2 H_R}{\partial m^2} = H_R\left(\beta_D^{\alpha}-\beta_S^{\alpha}\right)\left\{\frac{\gamma\alpha(1-m)(\beta_D^{\alpha}-\beta_S^{\alpha})-2(1-\gamma\alpha)\left[m(\beta_D^{\alpha}-\beta_S^{\alpha})+\beta_S^{\alpha}\right]}{(1-m)\ (1-\gamma\alpha)^2\left[m(\beta_D^{\alpha}-\beta_S^{\alpha})+\beta_S^{\alpha}\right]^2}\right\}$$

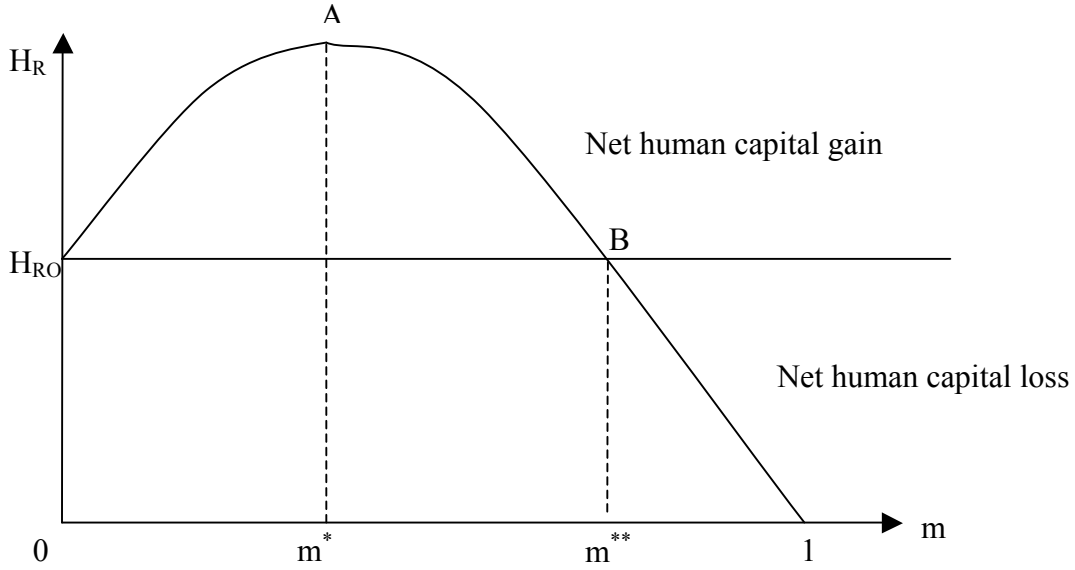
Under the condition $\frac{\beta_D^{\alpha}}{\beta_S^{\alpha}} > \frac{(2-\gamma\alpha)(1-m)}{\left[\gamma\alpha-m(2-\gamma\alpha)\right]}$, the second derivative of H is negative implying that $H_R(m)$ is concave and that the maximum of H is obtained through the necessary and sufficient condition that is $\frac{\partial H_R}{\partial m}=0$ (Appendix I, Demo 3). This implies that the optimal value for the emigration rate is given by:

$$m^* = \frac{\left[\beta_D^\alpha - (2-\gamma\alpha)\beta_S^\alpha\right]}{(\beta_D^\alpha - \beta_S^\alpha)(2-\gamma\alpha)} \quad (6)$$

The optimal emigration rate that can be obtained for the maximization of H appears to be directly related to most of the parameters of the problem. It has to be noted though that the numerator should be positive in order to meet the conditions imposed on m. This leads to the following restriction: $1 \le (2-\gamma\alpha) \le \frac{\beta_D^\alpha}{\beta_S^\alpha}$. This condition implies that $(2-\gamma\alpha)$ is the minimal value for the relative productivity or relative wage below which migration is not optimal.

The above results are shown in Figure 2 where point A refers to the maximum of H attained at m^*. Point B corresponds to m^{**} [ii] where H_R starts getting lower than H_{R0} [iii].

Figure II.1.3: Domestic human capital stock with emigration and risk aversion



Proposition 1: A net human capital gain (brain gain) results when the value of human capital, under different values of emigration rate, is superior to the value of the initial

[ii] m^{**} is the solution of the following equation: $(1-m)\left[m(\beta_D^\alpha - \beta_S^\alpha) + \beta_S^\alpha\right]^{\frac{1}{1-\gamma\alpha}} = \left(\beta_S^\alpha\right)^{\frac{1}{1-\gamma\alpha}}$

[iii] H_{R0} is the value of H_R attained at $m = 0$ with $H_0 = N\left[\frac{c}{\gamma a^\alpha \beta_S^\alpha}\right]^{\frac{1}{\gamma\alpha-1}}$

human capital under the absence of emigration. The human capital gain can reach a maximal value at m^* and returns to its initial value at m^{**}, while brain drain starts when human capital is lower than H_{R0}.

3.2. Effects of Changes in risk attitudes

In order to refine the understanding of aggregate decisions, variations with respect to the level of risk aversion (α) are useful as aggregate decisions include a large variation of risk attitudes of skilled labor migrants.

For that purpose, the relative human capital (H_R/H_{R0}) as well as the optimal (m^*) emigration rate are analyzed in relation to changes in risk attitude (α).

The functions for the relative human capital and its first derivative are given by (Appendix I, Demo 4):

$$\frac{H_R}{H_{R0}} = (1-m)\left\{\frac{\left[m\left(\beta_D^\alpha - \beta_S^\alpha\right) + \beta_S^\alpha\right]}{\beta_S^\alpha}\right\}^{\frac{1}{1-\gamma\alpha}} \tag{7}$$

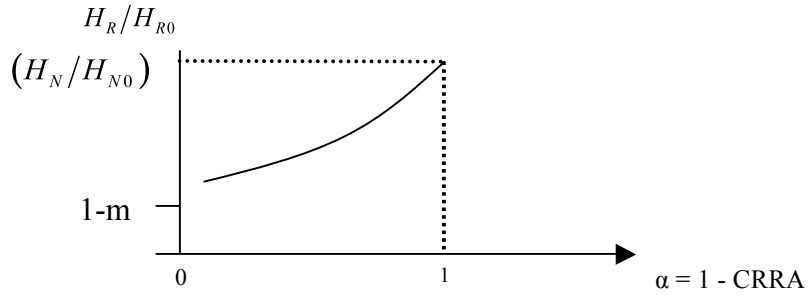
$$\frac{\partial\left(\mathrm{H_R}/\mathrm{H_{R0}}\right)}{\partial\alpha} = \frac{1-\mathrm{m}}{1-\gamma\alpha}[\mathrm{m}(\beta_\mathrm{D}^\alpha/\beta_\mathrm{S}^\alpha - 1) + 1]^{\frac{\gamma\alpha}{1-\gamma\alpha}}\left\{\mathrm{m}.\left[\ln\left(\beta_\mathrm{D}/\beta_\mathrm{S}\right)\right](\beta_\mathrm{D}^\alpha/\beta_\mathrm{S}^\alpha) + \right. \tag{8}$$
$$\left. + [\mathrm{m}(\beta_\mathrm{D}^\alpha/\beta_\mathrm{S}^\alpha - 1) + 1]\cdot\ln[\mathrm{m}(\beta_\mathrm{D}^\alpha/\beta_\mathrm{S}^\alpha - 1) + 1]\cdot\frac{\gamma}{(1-\gamma\alpha)}\right\}$$

Since $\alpha \in]0,1]$, $\frac{\partial\left(\mathrm{H_R}/\mathrm{H_{R0}}\right)}{\partial\alpha}$ is positive and the function H/H_0 is increasing with α (Appendix I, Demo 4).

Furthermore, using expressions (2) and (7), it can be easily shown that for any $\alpha \in]0,1]$, $H_R/H_{R0} < \left(H_N/H_{N0}\right)$. Equality in relative human capital occurs when $\alpha = 1$

Figure II.3.1 shows the shape of H_R/H_{R0} as function of α. It has to be noted though that the function starts at value higher than $(1-m)$ as $(\alpha = 0)$ is not included. When $\alpha = 1$, this is the case of risk neutrality. In addition, the sign of the second derivative of H/H_0 as function of α is positive (Appendix I, Demo 4).

Figure II.1.4: Effects of the Level of Risk Aversion on the Relative Domestic Human Capital Curve



Proposition 2: H/H_0 under relative risk aversion is lower than the level occurring under risk neutrality. This says that higher attainment in relative human capital is achieved under neutrality to risk.

Regarding the optimal level of skilled labor migration, the derivative of m^* (expression (5)) is given by (Appendix I, Demo 5):

$$\frac{\partial m^*}{\partial \alpha} = \frac{\beta_D^\alpha \beta_S^\alpha (2-\gamma\alpha)(1-\gamma\alpha)[\ln(\beta_D^\alpha) - \ln(\beta_S^\alpha)] + \gamma\beta_D^\alpha(\beta_D^\alpha - \beta_S^\alpha)}{(\beta_D^\alpha - \beta_S^\alpha)^2(2-\gamma\alpha)^2}.$$

This derivative is always positive within the interval of definition of $\alpha \in]0,1]$, implying that m^* increases (decreases) with increases (decreases) in α (Appendix I, Demo 5).

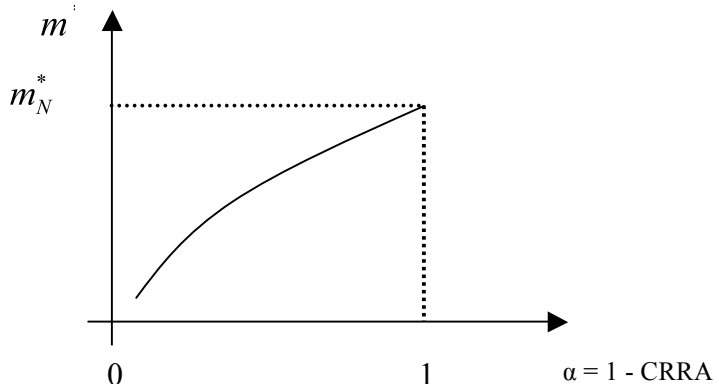
The maximum value of m^* is obtained for $\alpha = 1$, that is $m^*(1) = \frac{[\beta_D - (2-\gamma)\beta_S]}{(2-\gamma)(\beta_D - \beta_S)}$, which equals the value of m^* under risk neutrality (Appendix I, Demo 3):

$$m_{RN}^* = m^*(1) = \frac{[\beta_D - (2-\gamma)\beta_S]}{(2-\gamma)(\beta_D - \beta_S)} \quad (9)$$

In addition, it can be easily shown from expressions (5) and (9) that for any $\alpha \in]0,1]$, $m^* < m_{RN}^*$.

Figure II.1.5 draws the shape of m^* as function of α.

Figure II.1.5: Effects of the Level of Risk Aversion on the Relative Domestic Human Capital Curve



Proposition 3: The optimal emigration rate (m^*) under relative risk aversion is lower than the level occurring under risk neutrality. This says that higher attainment in optimal emigration is reached under neutrality to risk.

II.1.3 Empirical Investigations

Using the available data and mainly the database of Marfouk, the case of emigration of medical doctors in Eastern Europe is used for empirical investigations. This analysis is based on the data on the emigration of physicians in CEE countries provided by A.Bhargava, F.Docquier and Y.Moullan (2010). Prior versions of this database are by F.Docquier and A.Marfouk (2006 and 2008).

A. Descriptive analysis

As said above, the "Medical Brain Drain" is a new panel data on physicians' emigration rates (1991-2004). This dataset is recognized by the authors as a product of the Trade Team - Development Research Group which is part of a larger effort in the group to measure the extent of the brain drain as part of the International Migration and Development Program.

a- ECE Countries

According to this database, the ECE countries have shown high levels of emigration of medical doctors. The main countries of destination are UK, USA, France, Canada, Germany, Belgium, Australia, Italy, Sweden, Switzerland and Austria. The current

empirical investigation focuses on ECE countries: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

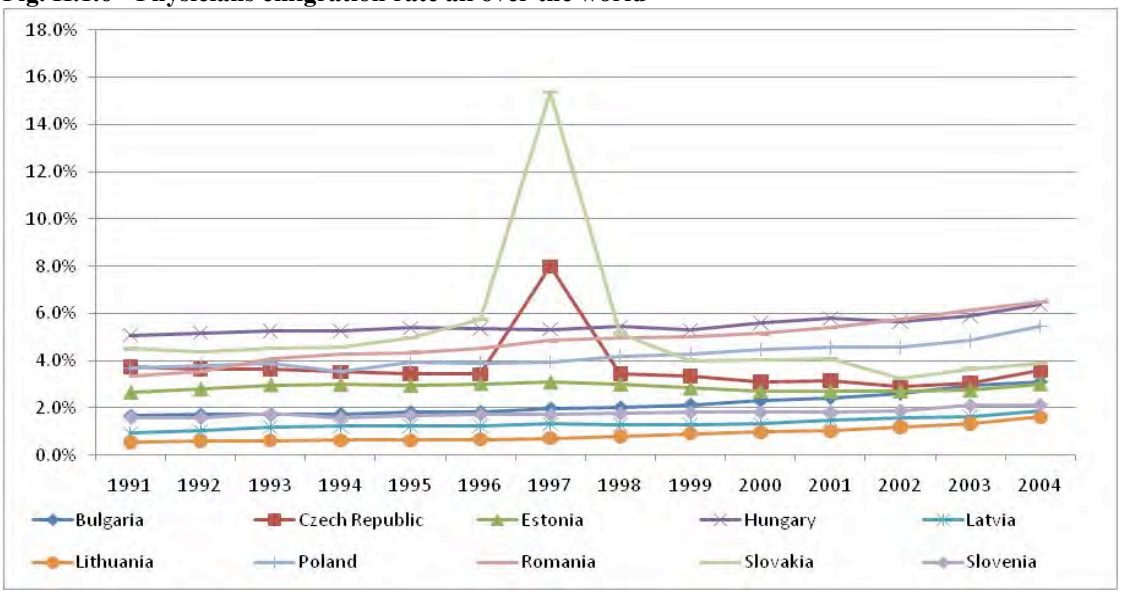
The total emigration rate of physicians related to all destinations ranges from 0.5% to 15% during the analysed period of time: 1991-2004. Apart from Slovakia and Czech Republic we observe during the analysed period (1991-2004) an increasing trend in emigration rate with 1% in average. The same evolution could be observed for emigration rate in Europe. Almost 50% of physicians emigrates prefer European countries because of the geographical proximity, of cultural connections and in some cases language similarities.

Since its separation from the Czech Republic in January 1993, Slovakia has been undergoing a double economic change: from a socialist to a free market system and from a subordinate to an independent economy. Despite his good economic performance (one of the highest growth rates in ECE - 6.5%, small inflation – 6%), in 1997, Slovakia was the only country removed from the list of candidates for accession to the European Union and NATO because of shortcomings in democracy. These special circumstances had unusual effects on emigration rates of physicians:

- Slow increase during the period 1991-1996 from 4.5% to 5.7%;
- Sharp increase to 15.4% in 1997 followed by a sharp decrease to 5.1% in 1998;
- Slow decrease since 1998 from 5.1% to 3.9%.

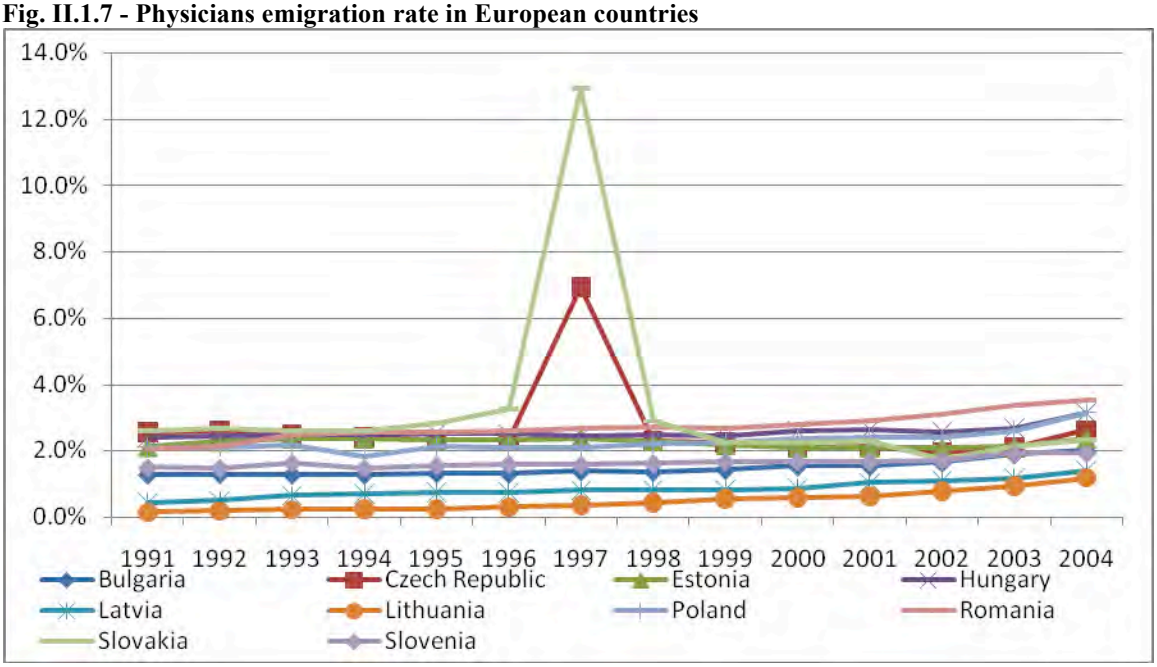
As for other ECE countries, Slovakians prefer to emigrate in European area. Germany is the preferred destination country (emigration rate in Germany being 11% in 1997).

Fig. II.1.6 - Physicians emigration rate all over the world



Source data: A.Bhargava, F.Docquier and Y.Moullan (2010)

Fig. II.1.7 - Physicians emigration rate in European countries



Source data: A.Bhargava, F.Docquier and Y.Moullan (2010)

The Czech Republic is one of the most stable and prosperous of the post-Communist states. Emigration, which initially increased in the years just after independence in 1989, dropped significantly after 1993. In case of physician's migration we observe very few variations around 3.5% between 1991 to 2004, apart from the year 1997 when a sharp increase to 8% is observed for only one year. The main destination country for these medical doctors was Germany, similar to Slovakia.

Table II.1.3.1: Country annual trends in emigration rate of physicians[72]

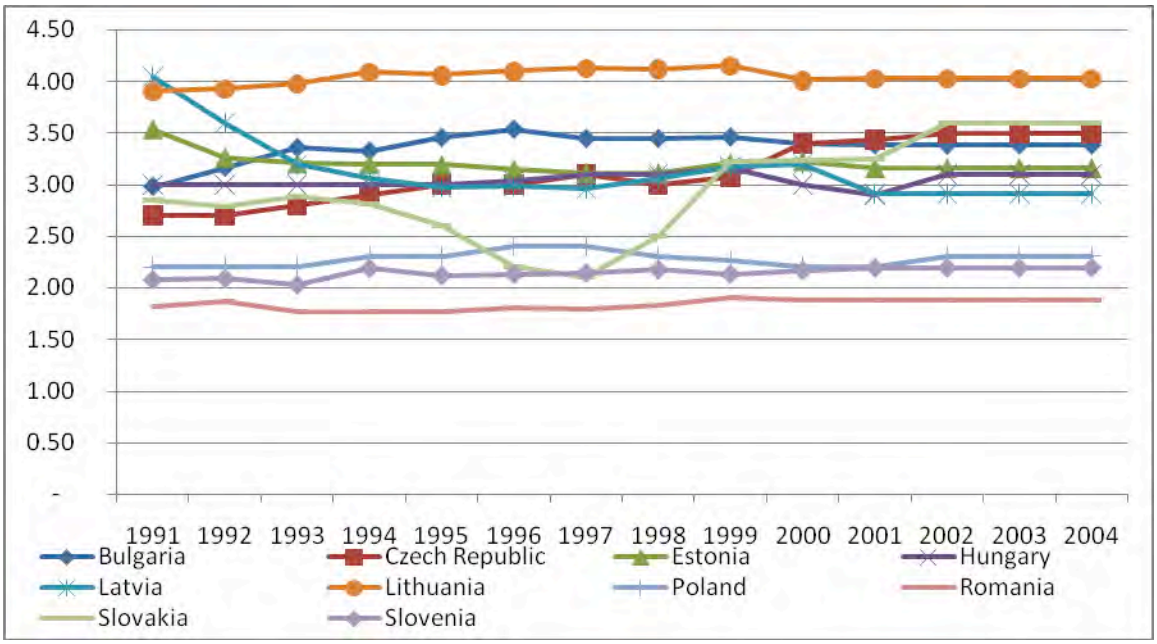
	R squared	Intercept	t-stat constant	Coefficient	t-stat coefficient	Observations
Bulgaria	0.89	1.346	14.83	0.11	10.00	14
Czech Republic	0.03	4.11	5.65	-0.05	-0.62	14
Estonia	0.02	2.91	34.19	-0.005	-0.5	14
Hungary	0.76	4.96	51.19	0.07	6.24	14
Latvia	0.87	0.91	17.29	0.05	9.05	14
Lithuania	0.86	0.34	4.96	0.07	8.71	14
Poland	0.84	3.36	27.34	0.11	7.94	14
Romania	0.98	3.23	36.5	0.21	20.69	14
Slovakia	0.02	5.99	3.43	-0.11	-0.55	14
Slovenia	0.81	1.51	35.43	0.04	7.28	14

The trend pursued by each country with regard to the emigration rate of medical doctors is shown in Table II.1.3.1. These trends are statistically significant with a level of significance of 0.01 for all countries apart from Czech Republic, Estonia and Slovakia. Furthermore, all the countries in the sample have statistically significant intercepts that are generally high, with the exception of Latvia and Lithuania. It can be noted that Romania has the highest trend meaning that the emigration rate of physicians increases constantly during 1991-2004 attaining the highest level in 2004 among ECE countries.

The emigration rate needs to be correlated with the domestic availability of medical doctors. When this latter variable is measured by the number of physicians per 1,000 people for each country, large variations appear between countries. Romania, Poland and Slovenia attain levels below three doctors per 1,000 people. The other countries have up to three doctors per 1,000 people, Latvia and Lithuania attaining levels up to four.

Fig. II.1.8 - Physicians per 1000 people in ECE countries

[72] Source data: Eurostat Database



Source data: A.Bhargava, F.Docquier and Y.Moullan (2010)

The trend pursued by each country with regard to the domestic availability of doctors is shown in Table II.1.3.2. These trends are statistically significant with a level of significance of 0.05 for all countries apart from Hungary, Lithuania and Poland. Estonia and Latvia followed a negative trend with a decrease of almost 0.5 physicians per 1000 people in Estonia and of more than one physician per 1000 people in Latvia. The annual changes range from 0.009 in Slovenia to 0.7 in Czech Republic and Slovakia. Furthermore, all the countries in the sample have statistically significant intercepts that are generally high.

It can be noted that Slovakia has the highest variation in domestic staffing by medical doctors with a decrease of 0.76 physicians per 1000 people from 1991 to 1997 followed by an increase of 1.5 physicians per 1000 people from 1997 to 2004. This evolution is in opposition with the evolution of emigration rate of physicians. Therefore, in case of Slovakia the emigration flows of physicians are not the result of the increasing number of physicians but involve decreases in medical workforce on internal labor market.

In case of Czech Republic the high emigration flow of physicians in 1997 could be a result of the high number of physician on the internal market. Therefore, in case of Czech Republic the emigration serves as a regulator on the physician's labor market.

Table II.1.3.2: Country annual trends in number of physicians per 1,000 people[73]

	Min level	Max level	R squared	F stat	Intercept	t-stat constant	Coefficient	t-stat coefficient	Obs.
Bulgaria	2.98	3.54	0.26	4.24	3.23	45.81	0.017	2.06	14
Czech Republic	2.70	3.50	0.93	168	2.60	57.36	0.07	12.96	14
Estonia	3.11	3.54	0.31	5.47	3.31	65.02	-0.01	-2.34	14
Hungary	2.90	3.16	0.16	2.26	2.99	80.84	0.006	1.5	14
Latvia	2.91	4.05	0.47	10.83	6.53	25.84	-0.05	-3.29	14
Lithuania	3.90	4.15	0.10	1.39	3.99	98.6	0.005	1.18	14
Poland	2.20	2.40	0.04	0.54	2.25	56	0.003	0.74	14
Romania	1.76	1.91	0.49	11.43	1.77	79.86	0.01	3.38	14
Slovakia	2.10	3.60	0.42	8.56	2.37	10.69	0.07	2.93	14
Slovenia	2.03	2.19	0.62	19.65	2.07	111.22	0.009	4.43	14

b- MENA Countries

According to the same database, the MENA countries have shown high levels of emigration of medical doctors. The main countries of destination are UK, USA, France, Canada, Germany, Belgium, Australia, Italy, Sweden, Switzerland and Austria. Given the lack of data on some countries like Mauritania and Sudan, the current empirical investigation focuses on the remaining countries that are Morocco, Algeria, Tunisia, Libya, Egypt, Jordan, Syria, Turkey and Yemen.

The total emigration rate related to all destinations ranges from 0.1% to 12%. Intermediate levels are recognized for the remaining countries with values between two and four percent.

Even though the rate in 2004 appears to be high, the trends expressed over the period 1991-2004 are constant or decreasing for most of the countries in the region. The countries displaying increasing rates are Algeria and Libya. All the other countries have either constant or decreasing annual trends. The decreases, even if statistically significant, are still low. Syria, Jordan and Egypt have revealed an important reduction in their rates of emigration of physicians.

Two observations related to the 1991-2004 trends (Table II.1.3.3) expressed by each country can be introduced. The first observation is that the decreases are low. The second observation is that these trends are obtained from net emigration rates and may also be

[73] Source data: Eurostat Database

related to other factors that are outside the willingness of these countries to retain their medical doctors.

The emigration rate needs to be viewed with the domestic availability of medical doctors. When this latter variable is measured by the number of physicians per 1,000 people for each country, large variations appear. Egypt attains a level above two doctors per 1,000 people. The other countries are largely below two doctors per 1,000 people with most of them being between one and 1.5.

Table II.1.3.3: Country annual trends in number of physicians per 1,000 people

	R squared	Intercept	t-stat constant	Coefficient	t-stat coefficient	Observations
Algeria	0.70	0.84	40.12	0.02	5.31	14
Egypt	0.71	1.32	12.59	0.08	5.49	14
Jordan	0.93	1.38	37.86	0.06	12.60	14
Libya	0.02	1.31	49.78	0.00	-0.51	14
Morocco	0.77	0.24	8.89	0.02	6.40	14
Syria	0.87	0.87	21.58	0.05	9.09	14
Tunisia	0.35	0.62	23.29	0.01	2.54	14
Turkey	0.48	0.94	14.18	0.03	3.36	14
Yemen	0.33	0.17	10.76	0.005	2.45	14

The most important element in this analysis is the trend pursued by each country with regard to the domestic availability of doctors. Table II.1.3.3 shows the annual trends for each country. These trends are statistically significant for Egypt (0.08), Jordan (0.06) and Syria (0.05). The other countries have lower annual changes ranging from zero (Libya) to 0.03 (Turkey). The remaining countries have annual rates of 0.01 (Tunisia) and 0.02 (Algeria and Morocco). The estimated rate for Yemen is 0.005. Furthermore, all the countries in the sample have statistically significant intercepts that are generally high, with the exception of Yemen. It can be noted that Lebanon has the highest trend meaning that domestic staffing by medical doctors has been improving during 1991-2004. This is clearly consistent with the trend expressed by the domestic availability.

Table II.1.3.4: Trends of Annual emigration rates and stocks of medical doctors

Country	***Rate of Migration***			***Stock of Migrants***		
	R^2	***Intercept***	***Coefficient***	R^2	***Intercept***	***Coefficient***
Algeria	0.85	0.002 (0.78)	0.003 (8.19)	0.87	-45.54 (-0.51)	103.95 (8.91)
Egypt	0.50	0.07 (17.85)	-0.002 (-3.49)	0.98	5452.87 (74.90)	248.32 (26.09)
Jordan	0.54	0.08 (43.60)	0.0009 (3.79)	0.99	393.98 (30.87)	57.32 (34.36)

Libya	0.99	0.05 (33.99)	0.006 (33.58)	0.99	265.91 (18.96)	61.48 (33.53)
Morocco	0.46	0.07 (11.56)	-0.003 (-3.21)	0.97	432.98 (42.54)	25.86 (19.43)
Syria	0.37	0.17 (36.11)	-0.002 (-2.69)	0.99	2268.54 (48.09)	195.44 (31.69)
Tunisia	0.002	0.03 (19.46)	-0.00004 (-0.18)	0.92	173.88 (45.50)	5.78 (11.57)
Turkey	0.18	0.04 (12.41)	-0.0007 (-1.63)	0.94	2177.62 (66.57)	60.84 (14.23)
Yemen	0.03	0.01 (9.31)	-0.0001 (-0.59)	0.92	27.44 (17.09)	2.47 (11.76)

B. Testing for the validity of the theoretical model

This conducted in different steps with discussion on different parameters where the first one is related to education, the second one to relative wages while the last one introduces the behavioral parameter related to risk aversion. The assessment of these three sets of parameters will allow for the calculation of the theoretical relative domestic capital in each economy. These values are then compared with the observed relative capital as it is shown the published data on emigration of medical doctors. The theoretical and observed means of the values relative to each country and over 1991-2004 are then compared.

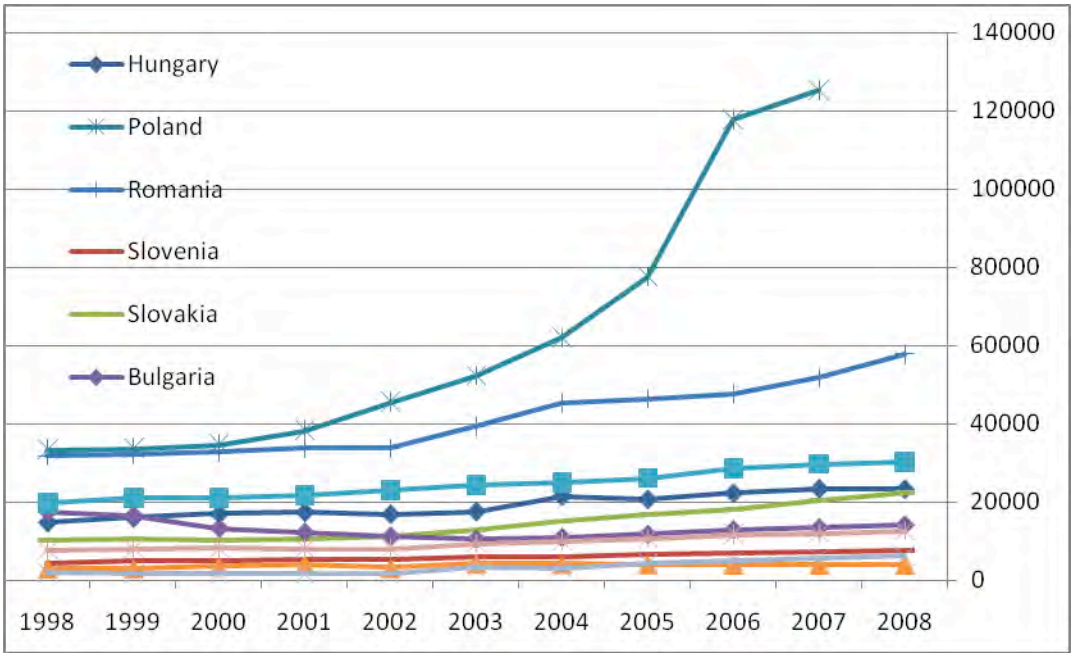
B.1. Estimations of the parameters for education

B.1.a. ECE Countries

The parameters γ and a are estimated from a regression model where the dependent variable is the yearly number of graduates from medical schools (GMS) in the studied ECE countries (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia), published by Eurostat for 1998 to 2008. The independent variable is the number of registered students per year in medical schools (RSPYMS) for the same countries and the same period of time.

After 1990, in all ECE a rapid growth of the higher education sector occurred and system has been generally liberalized. The private sector of tertiary education was developed and the public universities have extended their educational offer. The system of financing has changed and the autonomy of individual institutions has grown.

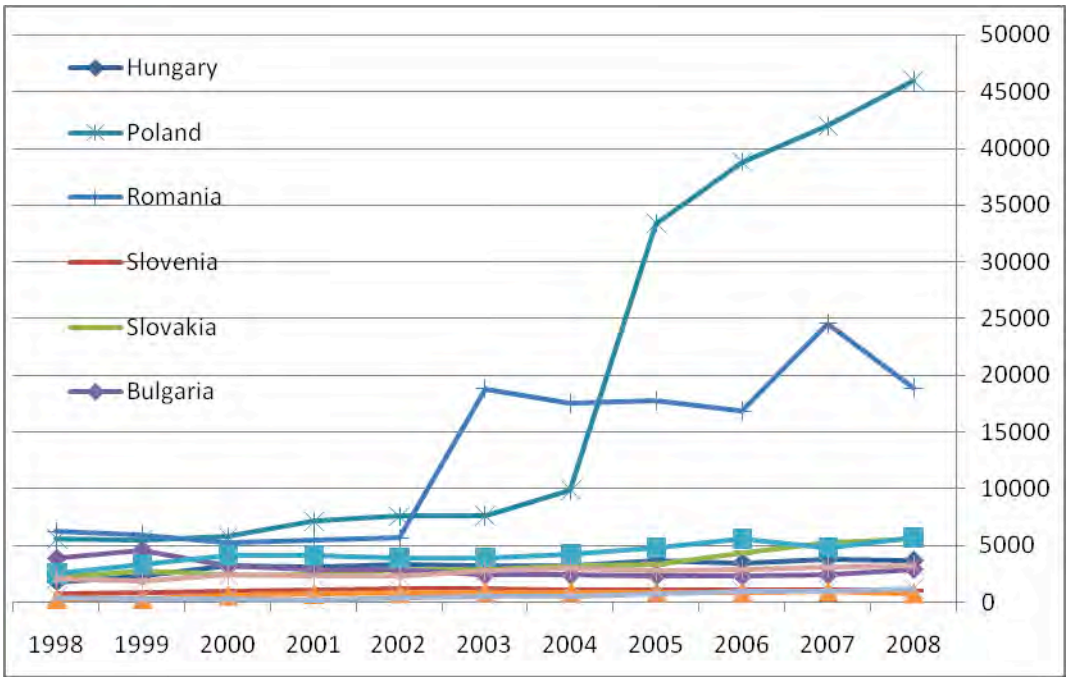
Fig. II.1.3.5 - Tertiary students (ISCED 5-6) in Health in CEE countries



Source data: Eurostat Database

The establishment of new medical schools has been delayed because of the special needs of medical specialization: well prepared professors, laboratories, places in hospitals for internships, etc. The impact of the establishment of new medical schools on the number of students in health had become visible in 2001. In Poland, the number of students in health increased more than three times and in Romania almost doubled in the last ten years. This sharp increase was has been the result also of the very high economic development of Romania and Poland during the last decade. Romania had recorded the highest rate of economic growth during the period of pre-assession to EU. Moreover the purchasing power increased, which have given the possibility to the parents and to the students to pay their studies. A significant change in the labour culture and organization and in the quality of existing human capital could be observed in all ECE countries. This gives the incentives to the young generation to invest more in education.

Fig. II.1.3.6 – Graduates (ISCED 5-6) in Health in CEE countries



Source data: Eurostat Database

About the results of medical schools, a slight increase in almost all ECE countries. In Poland the increase of the number of graduates has started since 2005. This delay appears because of the duration of the educational program of six years in medicine. An unusual evolution of the number of medical school graduates appears in Romania where the number of graduates increases significantly in 2003 and then decreases slightly for the next three years. One explanation could be the high number of students who started a private school of medicine and then abandoned it by joining a public financed one.

As shown before, a very high variation appears between ECE countries in the evolutions of the number of students enrolled in medical schools and of the number of graduates. Therefore, we have decided to estimate for each country a production function of education in Health. Because in some cases the evolution is not stable during the entire period of time we have chosen a shorter period of observation in order to estimate the regression coefficients. Most of the models could be validated with a probability of 99%. In Bulgaria, Estonia and Slovenia the models could be validated with 90%. But in Romanian case, the model could not be validated because of the very few cases which

could be included in the analysis. The economic instability has consequences on the results in education (Table II.1.3.5).

Lower γ is equivalent to lower productivity of medical education while higher γ is equivalent to higher productivity of medical schooling. By using these parameter estimates, country specific effects are discussed in the next subchapters.

Table II.1.3.5: Regression results for γ and a estimations:

Country	Years of observation	Number of observations	R^2	Intercept	Coefficient (gamma)	a
Bulgaria	2000-2008	9	0.18	3.31	0.49	27.40
Czech Republic	2000-2008	9	0.72	-0.90	0.92	0.41
Estonia	2000-2008	9	0.17	1.53	0.63	4.62
Hungary	2000-2008	9	0.62	4.38	0.38	80.13
Latvia	1998-2008	11	0.85	-0.78	0.89	0.46
Lithuania	1998-2008	11	0.79	0.19	0.84	1.21
Poland	1998-2004	7	0.92	-0.29	0.86	0.75
Romania	2004-2008	5	0.22	2.26	0.71	9.59
Slovakia	1998-2004	7	0.68	0.40	0.80	1.49
Slovenia	1998-2008	11	0.24	3.18	0.43	24.13

B.1.b. MENA Countries

The parameters γ and a are estimated from a regression model where the dependent variable is the yearly number of graduates from medical schools (GMS) in the studied MENA countries (Morocco, Algeria, Tunisia, Egypt, Oman, Jordan, Turkey, Bahrain, KSA, UAE and Syria), published in different country sources. The independent variable is the number of registered students per year in medical schools (RSPYMS) for the same countries. The regression provides the results in Table II.1.3.6. The model is used with only 11 countries of the MENA as one or both estimates are missing.

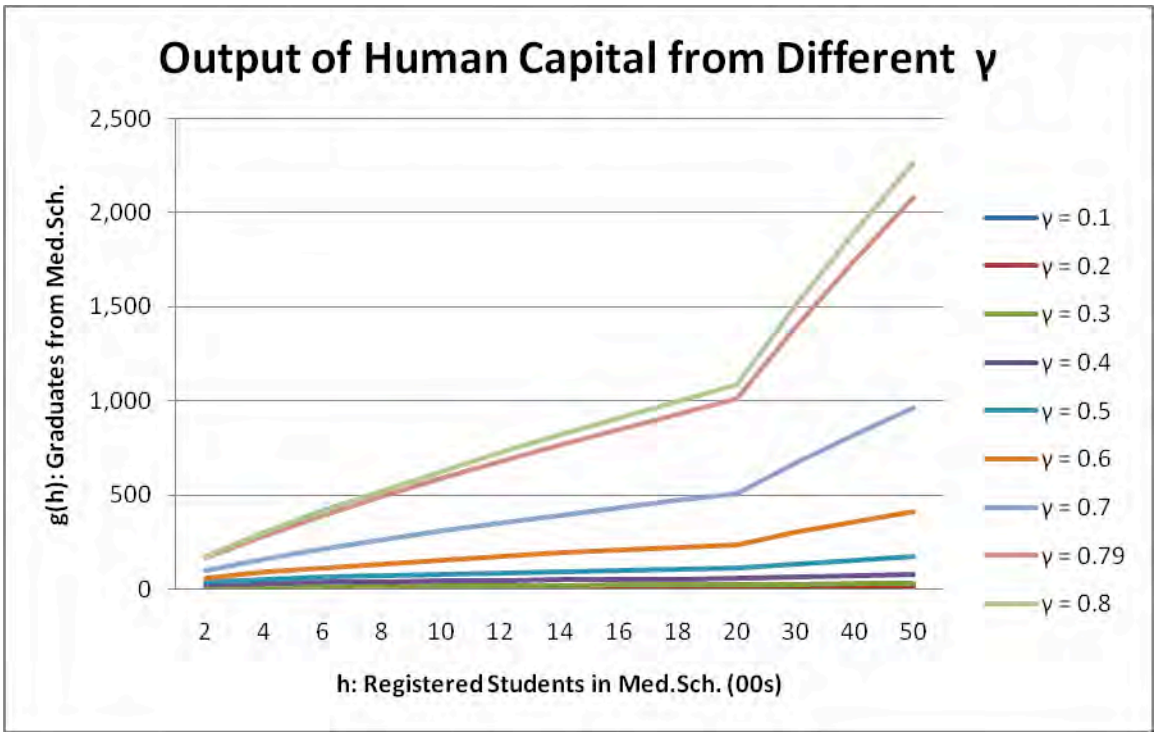
Table II.1.3.6: Regression results for γ and a estimations:

Regression result	R^2	Obs.	γ	a
$\ln(GMS) = \underset{(0.63)}{0.911} + \underset{(4.09)}{0.79} * \ln(RSPYMS)$	0.65	11	0.79	2.49

The results of this regression show significant coefficient (t-stat given below the estimate). These results provide an estimate of the exponent of h in g(h) that is 0.79.

Using these parameter estimates, country specific effects of emigration of medical doctors are discussed.

Figure II.1.3.7: Output of Human Capital from Different Gamma



The above shows clearly that as γ increases (decreases), the physical productivity of medical schooling increases (decreases) as expected from the sign of the derivative of g(h) with respect to γ with h higher than 1. Lower γ is equivalent to lower productivity of medical education while higher γ is equivalent to higher productivity of medical schooling. The above estimated γ may indicate that the candidates for emigration are those with 0.79 and this is a high level of γ.

B.2. Relative wages

B.2.a. ECE Countries

After the enlargement of EU, the main destination countries for East European emigration were Western countries of EU. Despite the increasing pressure of globalization and of the knowledge economy which promote labour migration, Fouarge and Ester (2008) find out that Europeans are not that willing to move to another country. Anyway, there are great disparities between countries, mostly between Eastern and

Western countries. Family and other social relationships, as well as housing and local environment conditions, are important factors in emigration decision, but Fouarge and Ester (2007a) and Bonin et al. (2008) show that employment-related factors, such as higher income, better working conditions, and opportunities of finding a suitable job are key migration motivators in Europe, and in the new members states in particular. Therefore we decided to study only the emigration in Western region of EU.

In order to compute the wage in destination country compared to the wage in the source country, we have chosen the average annual gross earnings in health and social care in each source country compared to the average annual gross earnings in health and social care for developed countries in EU, the old members (EU15). Table II.1.3.7 introduces the relative wages to be used in the future calculations.

Table II.1.3.7: The relative wages for EE countries

Country	Average annual gross earnings for Health and social work	Relative wage
EU 15	29937.1	
Bulgaria	2346.4	0.078
Czech Republic	7054.1	0.236
Estonia	-	-
Latvia	4010.9	0.134
Lithuania	5526.70*	0.185
Hungary	7243.2	0.242
Poland	4920.3	0.164
Romania	2883.3	0.096
Slovenia	-	
Slovakia	4637.4	0.155

Source data: Eurostat, 2005

* This value is obtained by extrapolation of data (available data only for 1997-1999)

B.2.b. MENA Countries

Given the distribution of salaries as well as the percent of medical doctors per European and American destinations and using 1 for North African, 1.5 for other Middle East, 2 for Golf, 3 for Europe and 4 for America, a weighted relative wage is computed as given in Table III.B.3. The US wage data are provided by the US doctor annual wages for average median specialty and for starting doctors provided under “Physician Compensation Survey, By the American Medical Group Association (AMGA)”. The European data are by OECD databases (2009). The MENA wages for medical doctors are taken from

different websites for different countries as summarized in Table II.1.3.8. Table II.1.3.9 introduces the relative wages to be used in the calculations.

Table II.1.3.8: Minimal wages for medical doctors in MENA countries

Countries	Doctors salaries per month
Morocco	New Generalist: 727 to 1200 €
	Specialist : 1200 to 2000 €
Algeria	Generalist: 250 to 500 €
	Specialist: 550 to 2000 €
Tunisia	Generalist: 791 to 1200 €
	Specialist: 1200 to 2000 €
Egypt	Doctors starts at 53$/month
	Doctors with experience: 1000 $
Jordan	Fresh graduates doctor: 325JD (1 JD=1.41 $ in 2010
	Doctors with experience (more than 15 years): 800JD
Turkey	In western cities, Doctors are paid approximately 3500,00-4000,00YTL in the private sector 1YTL= 0.64 $ in 2010
	Doctors are paid approximately: 15000,00 YTL in public sector
	In eastern and southern cities 15000,00 YTL , average wage in this region is: 10,000YTL
Yemen	The income of Yemeni physicians ranges between YR 19,000 and YR 340,000 1YR=0.005 $ in 2010

Table II.1.3.9: 1991-2004 Percentage of emigrant medical doctors and relative salaries by major destinations

Country of Training	%EU	% America	Weighted relative wages
Algeria	86.45	13.55	3.14
Bahrain	7.22	92.78	1.96
Egypt	32.41	67.59	3.68
Iran	28.32	71.68	3.72
Iraq	58.40	41.60	3.42
Jordan	42.44	57.56	2.38
Kuwait	16.77	83.23	1.92
Lebanon	11.18	88.82	2.59
Libya	86.89	13.11	3.13
Morocco	95.49	4.51	3.05
Palestinian Territory	41.51	58.49	3.58
Oman	26.84	73.16	1.87
Saudi Arabia	24.32	75.68	1.88
Sudan	85.17	14.83	3.15
Syria	24.72	75.28	2.50
Tunisia	91.82	8.18	3.08
Turkey	37.18	62.82	3.63
United Arab Emirates	1.27	98.73	1.99
Yemen	82.57	17.43	3.17

B.3. Risk aversion coefficients

Estimates of the constant relative risk aversion (CRRA) coefficient appear to be varying throughout the economic literature but all estimations tend to be around 1. Chetty (2003) found that positive uncompensated wage elasticity can result in a CRRA coefficient below 1.25, while the labor supply literature indicates that CRRA coefficient is close to 1. Szpiro (1986) found that the degree of relative risk aversion (the inverse of the CRRA coefficient) is approximately 2 (meaning a CRRA of 0.5). Cicchetti and Dublin (1994) estimated the degree of relative risk aversion to be of 0.6 (equivalent to a CRRA of 1.66). Fullenkamp et al (2003) considered that significant variations exist in the degree of relative risk aversion (between 0.64 and 1.76) meaning a CRRA of 0.83. Hartley, Lanot and Walker (2005) tried to estimate the degree of risk aversion and the way it varies across individuals using data from a popular TV game-show. The major result of this analysis is that the constant relative risk aversion coefficient is 1.

Halek and Eisenhower (2001) address the issue distinguishing between pure and speculative risks in order to understand risk aversion. Among their findings, they established that under both pure and speculative risks, individuals who already proved to be risk-takers by migrating across national borders are less risk averse compared with the native population. Also, unemployed people are more disposed to risk their current income for the possibility to double it (Haled and Eisenhower, 2001). Harrison, Lau and Rutström (2005) found that the Danish population exhibited constant risk aversion attitudes with coefficients around 0.45, 0.68 and 0.97. These attitudes are found to vary that with different socio-economic and demographic factors.

B.4. Testing for the validity of the model

As assumed above, medical doctors study medicine in their countries of origin but have to make decisions to emigrate by the end of their studies or later.

The theoretical aggregate level of human capital that stays in the country is derived from the model with the introduction of the values of the parameter related to education γ and the values of β_D and β_S with the observed "m" for each country. These parameters have been discussed in the previous two sections. Different values of the relative risk aversion coefficient are used including the one related to risk neutrality. The calculations provide

the theoretical values of the relative net human capital that are given by the theoretical model (the theoretical H/H_0).

The observed relative human capital is obtained from the database considering the lowest value of m as corresponding to H_0 with H as related to the other values of the emigration rates (human capital is considered to be the variable Total number of physicians). This allows for the computation of the observed H/H_0. Then we have performed of a t-test to compare the means of the theoretical and observed relative human capital in each country. If there is no evidence for rejecting the hypothesis of equality of means for theoretical and observed values then the model can be validated.

B.4.a. ECE Countries

The following tables introduce the results of comparisons between observed and theoretical relative human capital for each ECE country with available data. Firstly, we have computed the theoretical relative human capital under risk neutrality and by using the gamma estimated in previous tables for each country and a gamma equal with 0.25, a fixed value of productivity of education. These values are compared with the relative human capital observed. The detailed results could be found in Appendix 2. In Slovakia we have obtained that there is no evidence for rejecting the null hypothesis with a significance level of 0.05. Therefore the model could be validated under risk neutrality. For all other countries, the null hypothesis is rejected with the level of significance of 0.05. This means that the observed and the theoretical means are proved to be different. Therefore, the models cannot be validated under risk neutrality for Bulgaria, Czech Republic, Lithuania, Hungary, Poland and Romania (Table II.1.3.10).

Afterward we have computed the theoretical relative human capital under three risk aversion hypotheses, with alpha 0.33, 0.5 and 0.75 and by using the gamma estimated before for each country. These values are compared with the relative human capital observed. The detailed results could be found in Appendix 2.

In Bulgaria, Hungary, Poland, Romania and Slovakia there is no evidence for rejecting the null hypothesis with a significance level of 0.01 under risk aversion with alpha equal to 0.5. Therefore in Bulgaria, Hungary, Poland, Romania and Slovakia, the model could be validated under risk aversion with alpha equal with 0.5. In Czech Republic, Lithuania and Slovakia there is no evidence for rejecting the null hypothesis with a significance

level of 0.05 under risk aversion with alpha equal to 0.75. Therefore in Czech Republic, Lithuania and Slovakia the model could be validated under risk aversion with alpha equal to 0.75 (Table II.1.3.11).

We observed that the model for Slovakia could be validated under all hypotheses: risk neutrality, risk aversion with alpha equal to 0.5 and risk aversion with alpha equal to 0.75. Given that the highest p-value is obtained for the risk aversion model with alpha equal to 0.5, we will consider that Slovakia is a risk adverse country with alpha equal to 0.5.

Given these results, it can be inferred that the theoretical model used in this research does reproduce the data observed about the annual rates of emigration of medical doctors in the ECE countries as they are given by the database used. This is in favor of using the theoretical model selected to discuss the cases of each country.

Table II.1.3.10: Risk neutral summary table

Country	Statistics	H/H0 Theoretical Gamma estimated	H/H0 Theoretical Gamma = 0.25	H/H0 Observed
Bulgaria	Mean	1.35	1.87	1.07
	st dev	0.06	0.18	0.04
	p-value	0.00	0.00	
	t test	7.66	6.24	
Czech Republic	Mean	3.09	1.36	1.16
	st dev	2.49	0.21	0.10
	p-value	0.02	0.01	
	t test	2.52	2.87	
Hungary	Mean	1.10	1.33	1.02
	st dev	0.01	0.03	0.01
	p-value	0.00	0.00	
	t test	10.44	11.24	
Lithuania	Mean	1.13	1.08	1.02
	st dev	0.09	0.06	0.01
	p-value	0.00	0.00	
	t test	3.69	3.36	
Poland	Mean	2.14	1.51	1.04
	st dev	0.23	0.08	0.03
	p-value	0.00	0.00	
	t test	9.53	11.73	
Romania	Mean	2.14	2.43	1.05
	st dev	0.22	0.29	0.02
	p-value	0.00	0.00	
	t test	7.68	7.45	
Slovakia	Mean	1.68	2.03	1.30
	st dev	0.85	1.54	0.19

	p-value	0.33	0.03	
	t test	0.99	2.25	

Table II.1.3.11: Risk aversion model summary table

Country	Statistics	H/H0 Theoretical alpha=0.33	H/H0 alpha=0.5	H/H0 Theoretical alpha=0.75	H/H0 Observed
Bulgaria	Mean	1.01	1.03	1.12	1.07
	st dev	0.00	0.01	0.02	0.04
	p-value	0.00	0.07	0.00	
	t test	3.22	1.87	3.17	
Czech Republic	Mean	1.00	1.02	1.15	1.16
	st dev	0.00	0.01	0.07	0.10
	p-value	0.00	0.00	0.69	
	t test	4.76	4.14	0.41	
Hungary	Mean	0.99	1.01	1.04	1.02
	st dev	0.00	0.00	0.00	0.01
	p-value	0.00	0.02	0.00	
	t test	4.30	2.40	3.60	
Lithuania	Mean	1.00	1.01	1.03	1.02
	st dev	0.00	0.00	0.02	0.01
	p-value	0.00	0.00	0.95	
	t test	3.77	3.27	0.06	
Poland	Mean	1.00	1.04	1.17	1.04
	st dev	0.00	0.00	0.02	0.03
	p-value	0.00	0.41	0.00	
	t test	3.75	0.83	9.96	
Romania	Mean	1.01	1.07	1.26	1.05
	st dev	0.00	0.01	0.04	0.02
	p-value	0.00	0.07	0.00	
	t test	3.72	1.88	10.45	
Slovakia	Mean	1.00	1.04	1.17	1.30
	st dev	0.00	0.03	0.16	0.19
	p-value	0.05	0.58	0.21	
	t test	2.01	0.56	1.28	

B.4.b. MENA Countries

The following table introduces the results of comparisons between observed and theoretical relative human capital per country in the sending MENA countries. The test described above has provided the following results for each country and for the overall sample of economies from the MENA region.

Table II.1.3.12: t-statistic from comparing theoretical and observed relative net human capital

	Risk neutrality	Risk Aversion with α=0.75
Algeria	-2.73**	
Egypt	0.03**	
Morocco	-0.30**	
Syria	3.48**	
Tunisia	2.01**	
Turkey	-1.30**	
Yemen	0.28**	
Jordan	-0.03**	
Libya		-3.03**

** Significant at 99% probability level

Except for Libya, where the test is validated under risk aversion, all the other countries appear to support the model under risk neutrality. But, even for Libya, the constant risk aversion coefficient is 0.75 meaning that is not different from 1. Details related to the options of calculations with the implied results are included in the appendix.

Given these results, it can be inferred that the theoretical model used in this research does reproduce the data observed about the annual rates of emigration of medical doctors in the region as they are given by the database used. This is in favor of using the theoretical model selected to discuss the cases of each country and also the situation and trends in the overall MENA region.

II.1.4 Discussion of the Findings

Based on the results attained and given the level of emigration rate observed over the period 1991-2004, all countries included in this analysis appear to be benefiting from brain gains in the area of medical doctors. This means that domestic medical education is operating such that economies can still support the emigration of medical doctors at the current number of physicians in each country. Different results might be attained if the current staffing rates are further increased above the current observed trends. Under the current domestic educational system and with the current conditions of staffing, the countries under study appear to be enjoying brain gains. But, there are major variations expressed by the countries.

a- ECE Countries

The following set of graphs are the representations for each country, of the function $(1-m)\left[m\left(\left(\frac{\beta_D}{\beta_S}\right)^{\alpha}-1\right)+1\right]^{\frac{1}{1-\alpha\gamma}}-1$ in three cases of productivity of Health education (the estimated productivity for each country, gamma equals 0.1 and gamma equals 0.5).

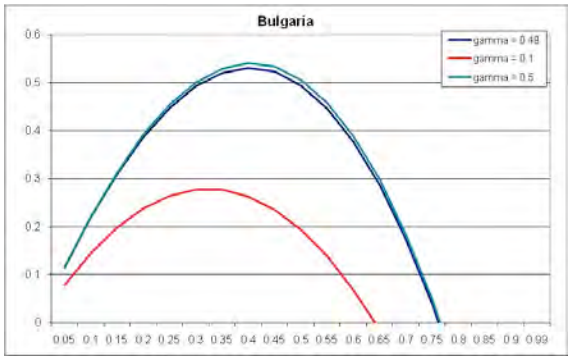
In case of productivity of Health education of 0.5, the highest level of brain gain is attained for levels of emigration which varies between 0.17 in Hungary to 0.45 in Romania. Most of the countries obtain the maximum brain gain to a value of emigration around 0.4. In Czech Republic and Lithuania (high risk adverse countries, alpha = 0.5) the maximum level of brain gain decreases very fast with the decrease of the productivity of Health education.

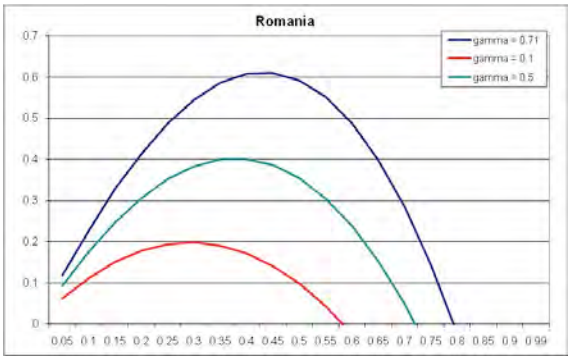
Table II.1.4.1: The emigration rate corresponding to the maximum value of brain gain

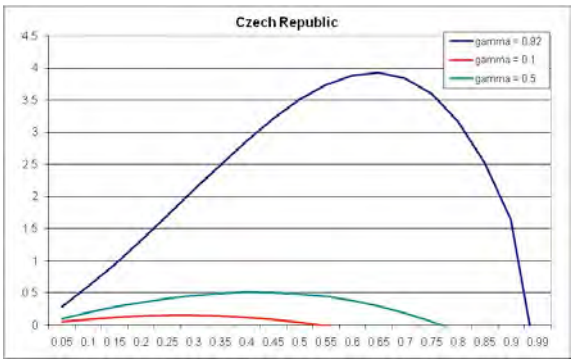
Country	m* Risk Neutrality	m* Risk Aversion, alfa = 0.33	m* Risk Aversion, alfa = 0.5	M* Risk Aversion, alfa = 0.75
Bulgaria	0.63	0.2	0.4	0.55
Czech Republic	0.9	-	0.32	0.64
Hungary	0.5	-	0.12	0.36
Lithuania	0.82	0.02	0.35	0.62
Poland	0.85	0.07	0.39	0.65
Romania	0.75	0.19	0.43	0.61
Slovakia	0.71	0.05	0.34	0.56

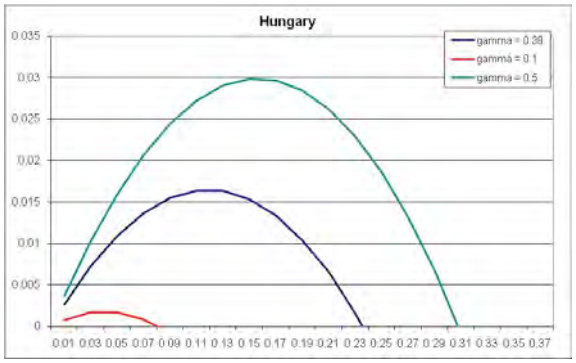
Lower productivity of education (lower values of gamma) enhance lower levels of m**, the emigration rate from which brain drain appears. For gamma equals to 0.5, the emigration rate from which brain drain appears varies between 0.31 in Hungary to 0.85 in Lithuania while for gamma equals to 0.1; it varies between 0.08 in Hungary to 0.67 in Lithuania.

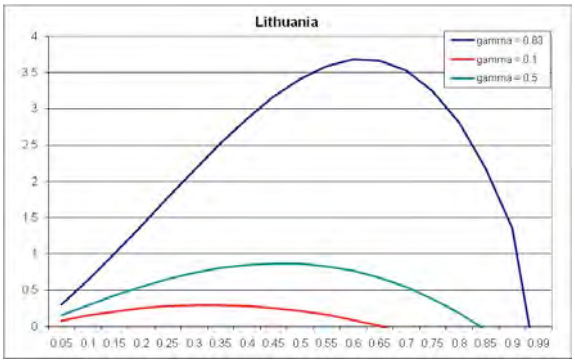
Fig. II.1.4.1 – Net Domestic Human Capital and Emigration of physicians per country

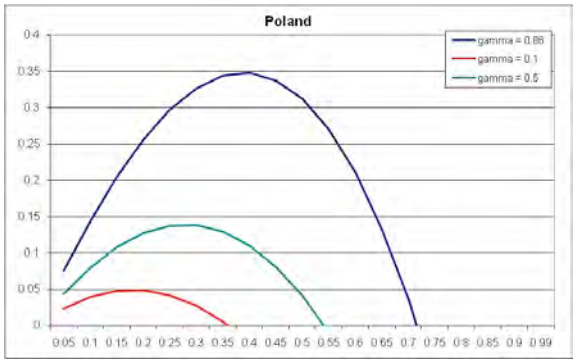


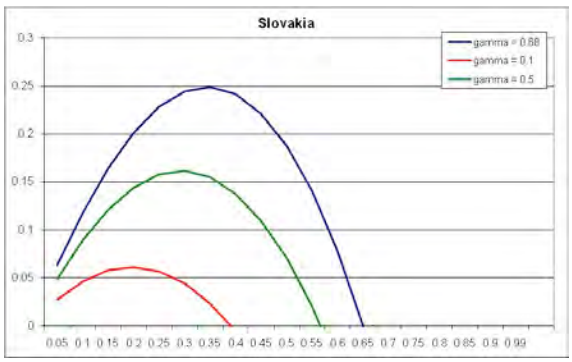












Note: Horizontal axis: emigration rate (m); Vertical axis: function $f(m)=(1-m)\left[m\left(\left(\frac{\beta_D}{\beta_S}\right)^{\alpha}-1\right)+1\right]^{\frac{1}{1-\alpha\gamma}}-1$

The countries with higher number of physicians per 1000 people enter later (for higher values of emigration) in brain drain then the countries with lower number of physicians per 1000 people. Lithuania and Czech Republic enter in brain drain region for the highest values of emigration and they have also the highest numbers of physicians per 1000 people. In opposition are Poland, Hungary and Romania, which enter in brain drain region faster and have the lowest numbers of physicians per 1000 people. This fact could be easily explained by the fact that the countries which dispose by a sufficient number of physicians, could "export" physicians to other countries which need this human resource.

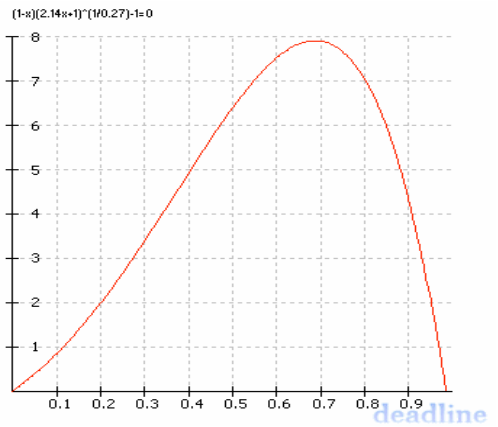
b. MENA Countries

The following set of graphs shows how Syria, Morocco, Tunisia, Egypt and Turkey and Libya with low maxima for domestic human capital (0.29, 0.36, 0.37, 0.41, 0.41 and 0.54 respectively) can enter easily the brain drain region under increases in emigration or reduction in education capacity. Countries such as Yemen, Jordan and Algeria appear to be in different situation with relatively higher maximal values for prospective emigration rates of medical doctors (0.69, 0.63 and 0.69 respectively). These results are confirmed with the information on m** that shows lower values for the first set of countries and almost the value of 1 for the second set of countries. Also, the maximal levels of domestic human capital exhibits variations with the largest values shown by Algeria and Yemen (8.00), intermediate values for Jordan (2.75) and Libya (1.45) and lower figures for the remaining countries (Syria: 0.15; Morocco and Tunisia: 0.35; Turkey: 0.55 and Egypt: 0.6).

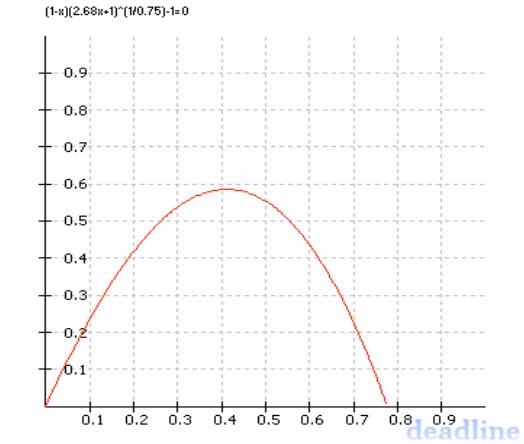
Under the current trends of emigration (1991-2004) of medical doctors, maintaining the current capacity for training of medical doctors can lead to net brain drain especially for the countries with low m* and low maximal values of the domestic human capital. The enhancement of the training capacity is a prospect that would account for these results and for the observed emigration trends. This requirement is not as instantaneous as it can appear for the set of countries with higher m* and higher values of the relative domestic human capital. These latters could have adjusted their training capacity earlier but needs to renew these adjustments through the enlargement of their training capacity.

Figure II.1.4.2: Net Domestic Human Capital and Emigration of Medical Doctors per country

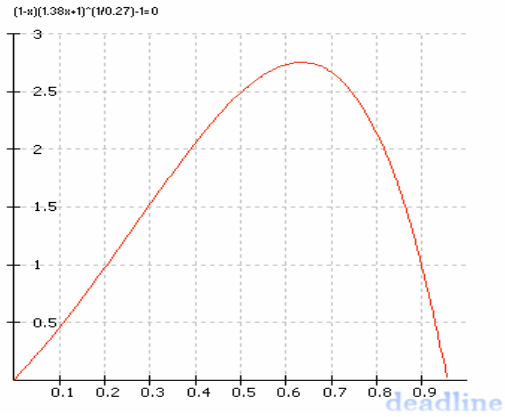
Algeria (m*=0.69, m=0.98)**



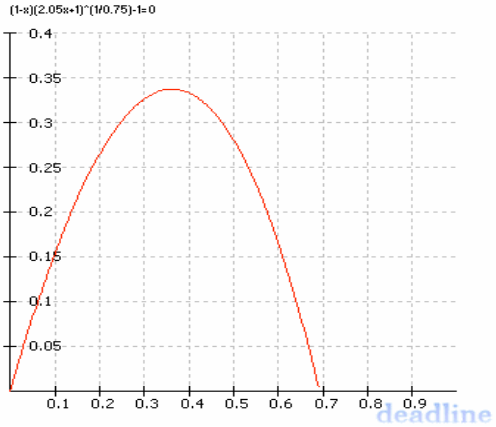
Egypt (m*=0.41, m=0.78)**



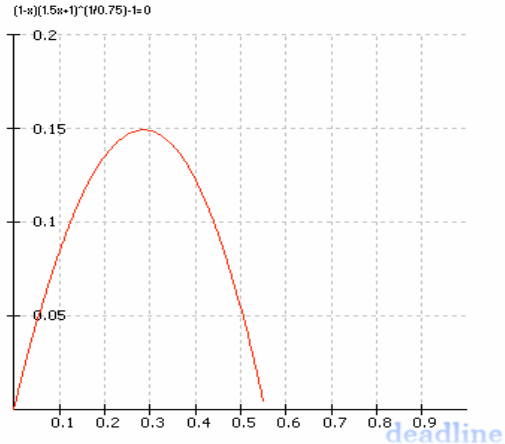
Jordan (m*=0.63, m=0.96)**



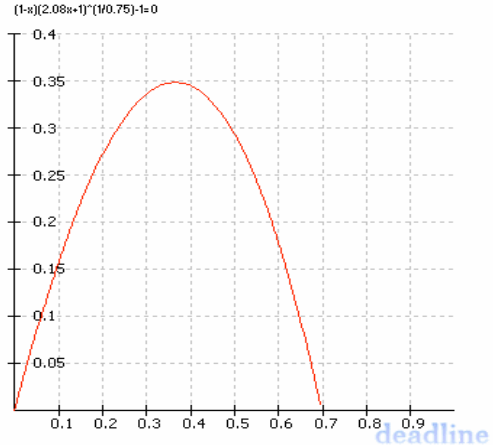
Morocco (m*=0.36, m=0.69)**



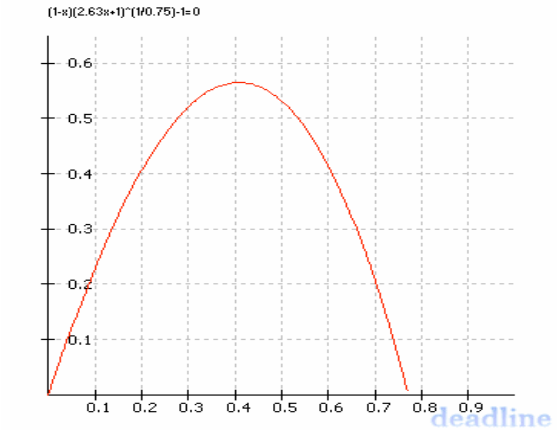
Syria (m*=0.29, m=0.55)**



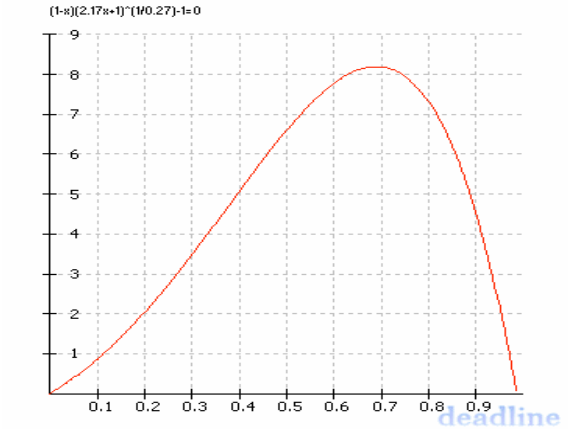
Tunisia (m*=0.37, m=0.7)**



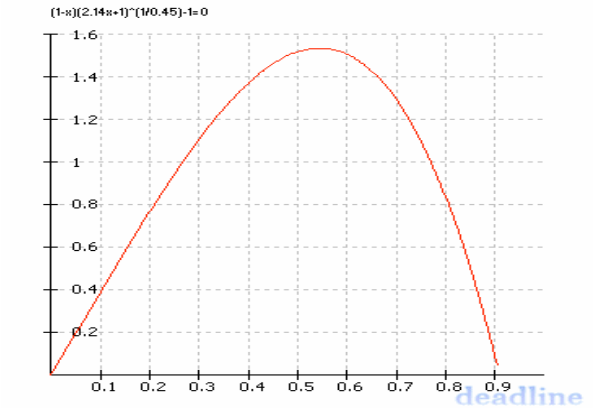
Turkey (m*=0.41, m=0.77)**



Yemen (m*=0.69, m=0.99)**



Libya (m*=0.54, m=0.91)**



Conclusion

In Bulgaria, Hungary, Poland, Romania and Slovakia the model of emigration brain drain is validated under the hypothesis of risk aversion with alpha equal to 0.5. In Czech Republic and Lithuania the model is validated under the hypothesis of risk aversion with alpha equal to 0.75. For Estonia, Slovenia and Latvia we do not have available data in order to test the model.

Based on the results obtained in the previous chapters and given the level of emigration rate observed over the period 1991-2004, all Eastern and Central European countries included in this analysis appear to be benefiting from brain gains in the area of medical doctors. This means that domestic medical education is operating such that economies can still support the emigration of medical doctors. Different results might be attained if the current staffing rates are further increased above the current observed trends. Under the current domestic educational system and with the current conditions of staffing, the countries under study appear to be enjoying brain gains. But high variations appear between countries in the levels of brain gain for different productivity functions of education.

Under a theoretical model derived from Stark et al. (2005) with the introduction of risk aversion (Driouchi et al., 2009), applications to most sending countries in the MENA region appears to be promising. The test of convergence between the observed values based on Docquier et al. (2010) data and the theoretical values obtained from the model is statistically conclusive. Parameters and indices are then derived from the domestic relative human capital for each country. They all show that these economies are enjoying globally brain gains in relation to the emigration of medical doctors. While risk neutrality applies to most countries, Libya has shown moderate risk aversion. The gains attained appear to exhibit low values and lower levels of the maximum level of emigration rates that would sustain these benefits. These countries are Syria, Morocco, Tunisia, Egypt and Turkey with low maxima for domestic human capital. The remaining countries show higher prospects in relation to these gains. This means that the economies under lower gains can enhance their capacity of education of medical doctors as means of enhancing their overall benefits. The other economies can still enjoy the gains for relatively longer

periods but should be concerned about the linkages between emigration, education and related economic policies.

The results attained under this research could benefit from further availability of more accurate databases on emigration, wages, and estimates of risk aversion and valuation of education. The results could also be better if microeconomic data were available for each country. These are major directions for future improvements.

II.2.Trends, Prospects & Perceptions by Medical Doctors from Morocco

This sub-part looks at the current situation of health deficits and shortages in Morocco as a case study for MENA economies. It aims at showing the roles of medical education as in the above models of new economics of skilled labor. The trends and prospects in both health care, medical staffing and medical education are analyzed. This shows the existence of prospective trends with demand for further cooperation in the areas of health care, medical education and research. These outcomes are promising for the pursuit of further cooperation that can lead to a mutual win-win collaborative process between North and Southern economies with no room for the brain drain debate in the case of medical doctors. Inputs from medical doctors are also introduced to show that the new economic model and its implications are consistent with the theory and the empirical findinds. These are introduced in the last section of this sub-part.

This is to show how the findings underlined in the previous sub-part can be used to characterize the inputs and outputs of the Moroccan health system. This starts with the characterization of the situation of Morocco in terms of health and medical education indices. This characterization is established through the identification of different variables related to the emigration of medical doctors and the determination of the principal trends observed. Health statistics are largely used from different sources and comparisons are made with other countries of the North African region. This characterization is followed by simulations of the major stocks and flows mainly in relation to the needs and to the decision of increasing the per year number of graduates from medical schools.

There are laws established by the ministry of health that ensure the effective use of the national health instruments and that improve the influence of medical education on the Moroccan economy. There is also research that allows better progress in this field and provides well-trained doctors that would impact on the national economy through migration. In addition, the health needs in Morocco are also studied in terms of supply and demand to discuss the emigration patterns of medical doctors. Economic issues are also discussed along with regulations issues to depict the general health picture in Morocco. So, what are the implications of health and medical education on the Moroccan economy?

Health professions are regulated by a number of laws that are all listed on the ministry of health web site. Thus, there are regulations for doctors and auxiliary medical personnel such as nurses and other paramedical personnel. So, exercising a medical profession is regulated by law 10-94 and its decrees of implementation, doctors' code of conduct reorganized by May 7th, 1949 decree, Dahir 1-84-44 related to the establishment and functioning of the national order of medical doctors and decree 2-84-780. The pharmacist profession, on the other hand, is regulated by Dahir 1-06-151 of 22 November 2006 bearing promulgation of law 17-04, bearing code of drug and pharmacy, pharmacists' code of conduct reorganized, approved and implemented by decree 2-63-486 of 26 December 1963, Dahir 1-06-151 of 22 November 2006 related to pharmacists order and decree 2-75-863, and the regulation of the pharmacy inspection (Ministry of Health, 2010). Concerning dental practice, it is regulated by the 1960 Dahir and implementation decrees, the national order of dental doctors and the code of conduct of dental (Ministry of Health, 2010). As for the nurses' profession, it is regulated by decree 1-57-008 of 19 February 1960. The other paramedical professions are also regulated by decree such as the midwife occupation and herbalist profession that are regulated by decree 1-59-367 of 19 February 1960 (Ministry of Health, 2010).

II.2.1 Characterization of the Moroccan Health System

The paper describes the situation of healthcare in morocco. This includes the description of health expenditures, the part allocated for the pharmaceutical sector and the budget distribution among health organizations and products. It is concluded from the 2006

health report "Comptes Nationaux de la Santé" that the size of the national health system financing is still low and healthcare is still expensive, that the financing is always fragmented, its distribution is inequitable and the collective health financing is still limited, that health insurance is not sufficient and that the allocation of resources is not compatible with the health priorities and its basic needs.

The ministry of health is the first healthcare provider in Morocco and has a bed capacity of 80%. According to the before mentioned 2006 report, the ministry of health receives 28.5% of the total health expenditure of the national health system. The remaining is used by hospitals (46.8%) and primary healthcare network (36.8%) approximately. In 2006, the total health expenditure attained around 30.6 billion Dirhams which is similar to 1002 Dirhams per capita[74]. These numbers show that the total healthcare expenditure corresponds to 5.3% of the gross domestic product (GDP) and 88% of that[75] is assigned to medical consumption (27.2 billion of Dirhams in 2006). The remaining 12% of total health expenditure is assigned to administration, collective prevention, education and research and training (Table II.2.1.1). The Moroccan total health expenditure as percentage of GDP is low in comparison to similar countries such as Jordan, Lebanon and Iran that have rates ranging between 6.8% and 9.7% (Ministry of Health/ WHO, 2006). The general government expenditure on health as percentage of total expenditure in 2006 was 26.2% and the private expenditure on health as percentage of total expenditure was 73.8% (WHO, 2009).

The total health expenditure includes the tax-based financing at the level of 22.6%, households-out-of-pocket expenditures (57.4%), health insurance (17%), employers (1.8%), foreign donors (0.7%) and others at 0.5%. The last report that describes the accounts of the health sector was published in 2006 and thus an annual increase of 10.1% in the total health expenditure was observed between 2001 and 2006. Given the population growth in that period, the total health expenditure increased by 8.6% between 2001 and 2006 (Ministry of Health/ WHO, 2006).

[74] US$ 114 with the 2006 exchange rate or US$ 209 in PPP.
[75] 891 Dirhams per capita per year.

Table II.2.1.1: Evolution of the Ministry of Health Budget, the Government Budget and GDP (in Dirhams, 1990-2008)

Years	Ministry of Health (MH) Budget	Gov. budget	GDP	Indices (1970 base)		
				MH Budget	Gov. Budget	GDP
1990	1 923 514 791	43 021 589 155	212 518 200 000	100	100	100
1991	2 160 851 924	46 019 442 325	241 355 500 000	112	108	114
1992	2 554 800 000	50 879 512 724	244 041 200 000	133	120	115
1993	2 713 099 000	56 948 136 880	250 022 600 000	141	135	118
1994	3 048 609 000	66 208 611 560	279 584 200 000	158	154	132
1995	2 915 885 000	65 948 019 000	282 467 100 000	152	157	133
1996/97	3 169 441 000	65 401 736 000	319 389 800 000	165	158	150
1997/98	3 622 404 000	74 219 181 000	318 342 100 000	188	180	150
1998/99	3 767 542 000	78 764 281 000	384 385 000 000	196	107	162
1999/00	4 977 180 000	81 766 040 000	389 569 000 000	259	111	183
2000	2 302 548 000	46 546 618 000	393 381 000 000	120	63	185
2001	4 953 966 000	96 574 155 000	426 402 000 000	258	132	201
2002	5 182 955 000	95 367 714 000	445 426 000 000	269	130	210
2003	5 189 160 000	97 747 005 000	477 021 000 000	270	240	224
2004	5 495 456 000	100 242 042 000	505 015 000 000	286	247	238
2005	6 217 920 000	120 677 308 000	527 679 000 000	323	303	248
2006	6 081 315 000	170 597 000 000	577 344 000 000	316	305	272
2007	7 374 195 000	185 877 666 000	615 373 000 000	383	334	290
2008	8 139 544 000	210 315 963 000	625 218 968 000*	423	388	294

Source: Ministry of Health/ WHO (2006). "Comptes Nationaux de la Santé"
* Estimation

Among the resources collected by the national health system, an important part is allocated to pharmaceutical expenditure including the purchase of drugs and medical products. Pharmaceutical expenditure accounted for more than 33.6% of the total health expenditure in 2006. Drugs and other medical products represented nearly 50% of the payments carried out by households. Besides, in a system where the weight of medicine in the total health expenditure is very high, the reimbursement of drugs is achieved by reference to the generic drug, if it exists, that carries a shared international name established by the list of drugs admitted for reimbursement. However, prescribers use 'princeps' drugs as reference in drug reimbursement, in the private sector which leaves a large part of health cots to be paid by households. The out-patient care has a weak share of the health system's expenditure (35.2%) due to the shortage in collective health prevention sector (quality assessment of drinking-water, information, education, communication…) whose expenditures hardly reached 2% of the total health expenditure.

In accordance with the health insurance schemes, public hospitals received only 9.8% of the payments made while private practices get the more important share of 27.1% along with 34.9% to private clinics. The share of direct expenditure of health coverage organizations for the benefit of public hospitals moved from 6% in 2001 to approximately 10% in 2006 (Ministry of Health/ WHO, 2006).

The share of direct payments by the households increased from 52% to 57% between 2001 and 2006 even with the implementation of the compulsory health coverage (AMO) in August 2005. However, the effective starting of the AMO through the first reimbursements of the managing organizations began only in March 2006 and many reforms were needed at the administrative level in terms of information system, human resources, communication and decentralization. In spite of the implementation of the primary health insurance especially the AMO, the institutionalized solidarity in the field of medical coverage in Morocco is still weak since the health insurance covers only 25% of the total Moroccan population, the crushing majority of which is urban (Ministry of Health/ WHO, 2006).

Besides this, the total health expenditure also benefits the national institutes and laboratories at the level of 3.3% of that budget. These latter constitute an important support for training and primary care network. However, their share is still inferior to that of the central and local administration (13.1%). To illustrate the importance of the medical education and training institutions related to the ministry of health, it is necessary to describe the primary statistics (Ministry of Health/ WHO, 2006).

Concerning basic health statistics, Morocco's performance is still weak in comparison to other countries of the MENA region. It was ranked 18 over 22 MENA countries in terms of life expectancy, child mortality, overweight, malnutrition, HIV/AIDS, expenses, hospital accreditations, doctors and hospital beds (Kjeilen, 2008). The Moroccan health system is defined by geographic differences, management of expenses and revenues and capacity. There are major differences in quality between the rural and urban sides of Morocco. The public services dominate the Moroccan health sector but private and semi-public services also exist. By 2008, the Moroccan medical system included 122 hospitals, 2400 health centers and four university hospitals just before the inclusion of the 5th university hospital of Oujda (Teach Mideast, 2008). A portion of the Moroccan

population has little or no access to clean drinking water or sanitary conditions especially in rural areas. Numbers from 2009 WHO report showed that 83% of the population has improved access to drinking-water sources and 72% can access improved sanitation (WHO, 2009). A study that took place in Morocco concluded that a project to improve access to water has yielded direct health benefits to the younger population by significantly reducing the prevalence of diarrheal diseases among children less than five years of age. It also led to longer-term benefits by improving school registration and retention rates for girls (Martin, 2008).

The Moroccan patients suffer from heart-related problems (394 per 100000[76]), cancer (95 per 100000[77]), respiratory diseases, metabolic diseases, endocrine-based diseases and parasitic or infectious diseases from unsanitary conditions and lack of clean drinking water. The Moroccan ministry of health affirmed that malaria, polio, diphtheria and tetanus disappeared from Morocco but other diseases continue to pose problems such as tuberculosis, HIV and measles.

Table II.2.1.2: Number of Doctors per 10000 People

Year	Number of Doctors
1960	1.06
1965	0.82
1970	0.76
1975	0.76
1981	0.54
1987	2.17
1993	2.14
1994	3.63
1997	4.60
2001	4.83
2004	5.10
2005	5.15
2006	5.22
2007	5.29

Source: Morocco (2008) ; Perspective Monde, «Médecins (par 1000 habitants) – Maroc».

The mortality rate caused by tuberculosis among HIV-negative people is 8 per 100000 people and among HIV-positive people is 0.1 per 100000 in 2007 (WHO, 2009). Around

[76] WHO- World Health Organization (2009), World Health Statistics.
[77] WHO (2009).

95 adults >15 years old per 100000 of the Moroccan population are infected with HIV/AIDS and the infant mortality rate continues to drop, to 36 deaths per 1000 births according to the 2009 WHO report, which is still high compared to other countries of the MENA region (Kjeilen, 2008; Teach Mideast, 2008). According to the 2009 WHO report, the number of physicians per 10000 people is 5, the number of nursing and midwifery personnel per 10000 people is 8 and the density of dentistry personnel is 1 per 10000 people during 2000-2007. More details about the density of physicians is given in Table II.2.1.2.

The progress observed in different health services indicators shows that the supply of health assistance reflects an increasing demand in terms of patients increase through the growth of the Moroccan population in need of medical services especially the youngest and the over 60 years old people. It also reflects an increase in the urbanization rate meaning the number of people living in urban areas, the increase in life and health expectancy at birth, the evolution of the human development index (HDI) and the increase in income per capita (Table II.2.1.3).

Table II.2.1.3: Indicators of the Moroccan demand for health services

	Years	Indicator
Life expectancy at birth (years)	1990	65
	2000	70
	2007	72
	2010	71.8
Healthy life expectancy at birth (years)	2007	62
Neonatal mortality rate (per 1000 live births)	2004	24
Total population ('000s)	2007	31224
% population under 15	2007	29
% population over 60	2007	8
Population annual growth rate (%)	1987-1997	1.7
Population annual growth rate (%)	1997-2007	1.2
Population living in Urban areas (%)	1990	48
	2000	55
	2007	56
Gross National Income ($ per capita)	2005	1060
Gross National Income per Capita (PPP 2008 $)	2008	4628
Human Development Index (HDI)	2003	0.63

Human Development Index (HDI)	2010	0.56

Source: WHO, 2006; HDR 2005, 2010; NationMaster.com[78] (Morocco, 2005)

The supply of health services concerns the development of medical hospitals, health centers in rural areas, equipment and new technologies. The Moroccan health system includes the public sector (health ministry and health services of royal armed forces), the semi-public sector (mutual insurance companies and entities of the CNSS) and the private sector comprises medical doctors, dentists, pharmacists and medical auxiliaries. An informal sector also exists and is based on traditional treatments. The national health system involves a network of structures that are rural dispensaries, communal health centers; communal health centers with childbirth module, local hospital, urban health centers, reference centers for family planning, diagnostic centers specialized in tuberculosis and laboratory of epidemiology and environment hygiene (Saidi, 2009). The health coverage entities in Morocco (Saidi, 2009) are known as the (1) National Social Security Fund (CNSS) that covers healthcare costs for active and retired employees of the private sector and their rightful dependents, the (2) National Fund for Social Welfare Works (CNOPS) that covers healthcare costs for active and retired employees of the public sector and their rightful dependents and the (3) National Agency of Medical Insurance (ANAM) that is responsible for regularizing the Compulsory Medical Insurance (AMO) and for managing the Medical Assistance Regime (RAMED).

In an assessment of the advancement towards the realization of the millennium development goals (MDGs), the 2010 fact sheet of the WHO (2010) gives the to-day achieved results generally including Morocco. This includes the decrease in the number of children dying (MDG4), the decrease in the number of underweight children (MDG1), the increase in the number of women being attended by skilled health professional while giving birth (MDG5), the decrease in the number of people contracting HIV (MDG6), the increased success in tuberculosis treatment (MDG6) and the improvement in drinking-water access (MDG7). With the deadline on reaching the MDGs set for 2015, it seems that Morocco's progress is still slow.

[78] http://www.nationmaster.com/red/country/mo-morocco/eco-economy&b_cite=1&all=1

To achieve progress in the health sector in Morocco, many factors and actors should be taken into consideration such as education of doctors in Morocco, research, emigration patterns, medical cooperation and the health needs of Morocco.

Table II.2.1.4: Medical Universities in Morocco (FMP, 2010)

Medical University	Settlement Date	Related University	CHU
Faculté de de Médecine et de Pharmacie de Rabat	16 October 1962	Université Mohammed V - Souissi	CHU Ibn Sina
Faculté de de Médecine et de Pharmacie de Casablanca	September 1975	Université Hassan II - Ain Chok	CHU Ibn Rochd
Faculté de de Médecine et de Pharmacie de Marrakech	October 1999	Université Cadi Ayyad	CHU Mohammed VI
Faculté de de Médecine et de Pharmacie de Fès	20 October 1999	Université Sidi Mohamed Benabdellah	CHU Hassan II
Faculté de de Médecine et de Pharmacie d'Oujda	13 October 2008	Université Mohamed Ier	CHU Oujda

Medical education is among the longest higher education in Morocco. The medical studies include three parts and take place in one of the five universities that have a medical and pharmaceutical college associated with one of the five university hospitals (Table 4). The total duration of studies varies between 8 (general medical studies) and 13 years (specialty studies). These studies include a first cycle of pre-clinical sciences (first and second year), a second cycle of clinical sciences (third to fifth year), a sixth year full-time external practice with the University Hospital Center (CHU), a seventh year training as intern in peripheral hospital and an eighth year for preparation and defending the doctoral thesis (Wikipedia, 2010).

The 2010-2011 seats for the five medical universities are identified in a note from the ministry of national education, management training and scientific research (MNEMTSR, 2010). Table II.2.1.5 shows the needs in terms of potential students.

Table II.2.1.5: Number of Seats in Medical Universities for 2010-2011 (MNEMTSR, 2010)

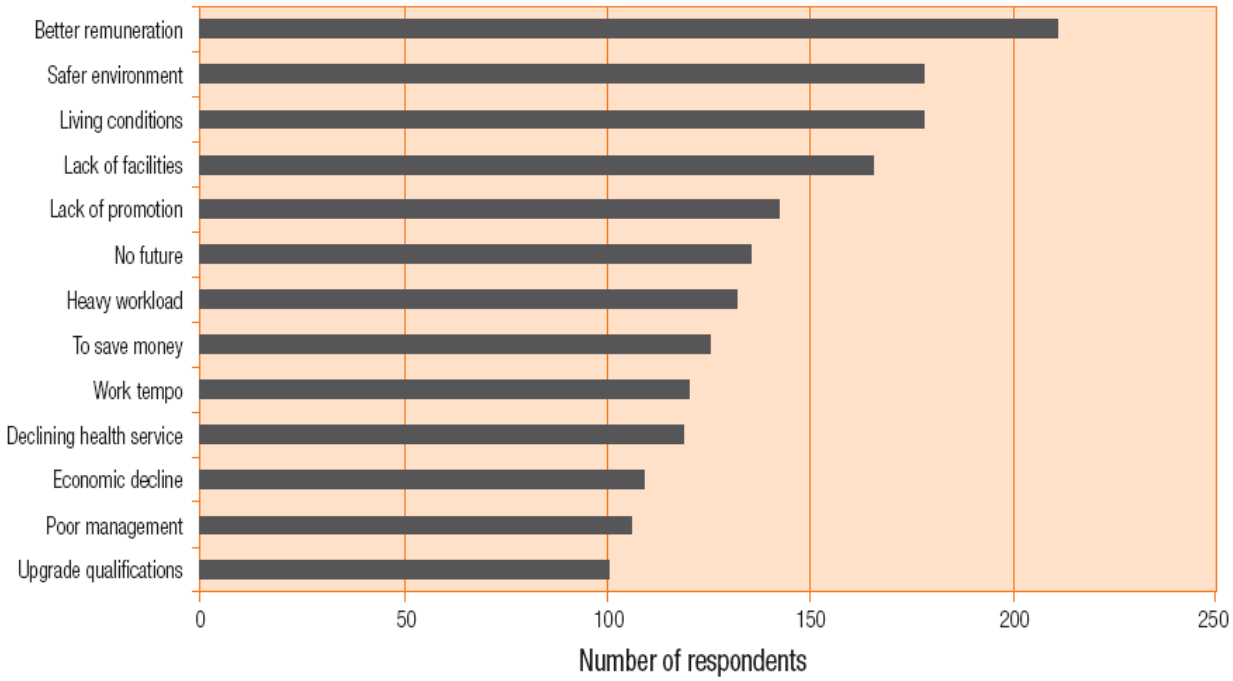
University	Total	Civil	Military
Medical and Pharmacy Studies			
Rabat	500	412	88
Casablanca	450	450	
Marrakech	275	275	
Fès	275	275	
Oujda	200	200	

Dental Studies			
Rabat	130	110	20
Casablanca	130	130	

The reasons behind the increasing emigration among doctors can be due to internal and external causes to the medical practice. However, the most important cause for emigration of trained doctors was to get better wages (WHO, 2006). Emigration takes place from rural to urban regions of a country such as Morocco, from poor to wealthier countries and also across continents. The reasons for this movement are to have a better life and improve working/living conditions. Doctors develop concern about their lack of promotion prospects, inefficient management, heavy workload, lack of facilities, a declining health service, high level of violence and inadequate living conditions (Figure II.2.1.1).

In Morocco, the national union of the doctors of the private sector (Syndicat National des Médecins du Secteur Libéral, SNMSL) stated the problems arising from the private practice of medical services. The problems are both internal and external. The internal ones include (1) disordered competition between colleagues of the same sector (absence of dialogue about fees while some call upon commission agents), (2) establishment of illegal conventions with social work organisms of different delegations, (3) opening of private structures to academic people and (4) disregard of regulations governing the practice of private medical services (SNMSL, 2003).

Figure II.2.1.1: Reasons for Health Workers from Four African Countries (Cameroon, South Africa, Uganda and Zimbabwe; WHO, 2006)



The external problems comprise (1) unfair competition from state establishments, institutions of benevolence (Moroccan Red Cross), hospital settlements of the ONE, ONEP, medical services of certain administrations, local government agencies…etc, hospital settlements of the CNSS and private hospitals without membership such as the Sheik Zaid Ibn Soultan Hospital. These latter do not pay taxes, they can get the land for a duration of 99 years against a symbolic price, personnel is paid by the government and their practice does not necessitate official authorization. The second problem concerns (2) the lack of guidance framework of private sector investments, supported by the population needs and damping possibilities by the deadlines set by the finance law. Then, (3) the government does not encourage private sector participation in the general health policy as it is the case for the other sectors. The other problems deal with (4) taxation and failures, (5) delivery of drugs by dispensaries without prescription, (6) the fight against the illegal medical practice is not efficient in spite of repeated complaints and (7) the informal privatization of the public sector puts the private sector in a bad competing position in terms of medical acts' costs applied in each sector (SNMSL, 2003).

Some of these reasons and others led to the pattern of emigration of medical doctors from Morocco to the European Union and the United States that experience an important lack in medical doctors. However, there is also the reverse movement of medical doctors from

developed countries to Morocco which explains the existence of foreign doctors in the country. In 2005, the number of foreign medical doctors and pharmacists was 619 foreigners (Khachani, 2010). This market opening is due to free trade agreements with the European Union and the United States. However, Moroccan doctors complain that they were not consulted and they fear the expected competition especially given the predicted draconian conditions of the health sector (A.B., 2009). Among the factors leading to the emigration of medical doctors is the promise of brain gain enjoyed by both sending and receiving countries. Driouchi and Kadiri (2010) state that the countries under lower gains such as Morocco can enhance their capacity of education of medical doctors as a way to improve their overall benefits.

Table II.2.1.6: Distribution of Medical Personnel of both Public and Private Sectors per region (June 2009; Ministry of Health, 2009)

Regions/ Indicators	Ministry of health doctors			Local Gov. Agencies	Professors, Researchers	Private Doctors		
	Generalist	Specialist	Total	Generalist	Specialist	Generalist	Specialist	Total
01- Oued Eddahab-Laguira	37	7	44	1	0	3	0	3
02- Laayoune-Boujdour-Sakia L'Hamra	67	39	106	3	0	15	17	32
03- Guelmim-Smara	124	23	147	3	0	24	4	28
04- Sous-Masa-Draa	416	207	623	10	0	237	205	442
05- El Gharb-Chrarda-Bni Hssaine	242	122	364	19	0	211	152	363
06- Chaouia-Ourdigha	261	131	392	14	0	199	84	283
07- Marrakech-Tensift-El Haouz	392	315	707	19	115	253	225	478
08- Region Orientale	297	148	445	22	0	246	218	464
09- Grand Casablanca	520	1518	2038	60	287	1244	1607	2851
10- Rabat-Sale-Zemmour-Zaer	595	1262	1857	50	718	548	762	1310
11- Doukkala-Abda	188	140	328	9	0	189	127	316
12- Tadla-Azilal	148	72	220	8	0	125	64	189
13- Meknes-Tafilalet	359	184	543	25	0	253	168	421
14- Fes-Boulemane	303	447	750	20	71	185	248	433
15- Taza-Al Hoceima-Taounate	233	92	325	11	0	91	32	123
16- Tanger-Tetouan	315	237	552	27	0	286	295	581
Total	**4497**	**4944**	**9441**	**301**	**1191**	**4109**	**4208**	**8317**

Research in the domain of medical services is very important and can improve the status of health in Morocco. According to the ministry of health the position of researcher/ professor is filled by 1191 specialist doctors that are distributed in the regions where the

first four hospital universities exist (Ministry of Health, 2009). So according to Table 6, the Professor/researcher position includes 718 in the region of Rabat only, 287 in the region of Casablanca, 115 in the region of Marrakech and 71 in the region of Fes.

II.2.2 Modeling the Future Requirements for Medical Doctors in Morocco

The fact that a shortage in the number of medical doctors exists is largely admitted and many countries tried projecting their needs in terms of physicians and finding solutions in order to achieve an increase in the number of doctors. The United States owns a good forecasting model and there is evidence from a Spanish paper that Spain too tries to improve this process in order to increase the number of doctors. This part will focus on describing the models in the literature and implementing a simplified model for the case of forecasting the number of medical doctors in Morocco by 2015.

Considering the Millennium development goals, it is agreed that there is a deadline till 2015 to achieve the eight objectives. Under the sub-goals, there is a reference to the improvement of the country coverage in medical doctors for many countries. This is to say that there is a shortage in the number of physicians per 10000 people or any other measure. As a result, countries need to measure their shortage, correct it for the short run and find ways to prevent it in the future through simulations that project the number of needed physicians in a given future date.

Scheffler et al. (2008) used 158 countries' updated information, from the World Health Organization (WHO) databases, about the supply of medical doctors over a period of 20 years (1980-2001) to project the size of the future global need for/ supply of and demand for physicians up to year 2015, given that it is the target date for the MDG. They used an exogenous health benchmark in order to decide on the sufficiency of number of medical doctors required to achieve the MDG where demand variables are based on the country's economic growth, that triggers an increase in worker salaries and thus increase their healthcare expenditures. Scheffler et al. (2008) used two approaches to modeling the requirements in medical doctors. The first one is a needs-based model that decides on the number of doctors per capita to cover up to 80% live births by skilled attendance. The second one is economic-based and it projects the number of physician per capita that will

probably be demanded based on the country's economic growth. The authors compared the demand-based and need-based estimates with the forecasted supply of physicians which is inferred by projections based on historical trends. The results of this study identify serious shortages of medical doctors in the WHO African region by 2015. Among the policy implications suggested in this WHO study was increasing medical doctors training or discouraging migration (Scheffler et al., 2008).

Barber and Lopez-Valcarcel (2010) also created an application to simulate Spain's supply and demand/need in terms of medical doctors per medical specialty (43) using system dynamics and compute the supply and deficit/surplus of physicians. The authors defined different scenarios whose parameters were variables controllable by health planners and included labor market, demographic and education variables in their models. Delphi method was also used to establish the specialists needed ratio per 1000 residents. The results of their simulation described a 2% increase in the deficit in terms medical specialists by 2025 (Barber and Lopez-Valcarcel, 2010). Therefore, Barber and Lopez-Valcarcel (2010) suggested an increase in the number of students registered in medical schools, a redesign of training programs to allow for mobility among specialties and a rise in immigration of doctors from the new European Union members and Latin America.

The US efforts in this field are old based on the model provided by the Medical Education National Advisory Committee needs-based model (U.S. Congress) in 1980 and the study done by Greenberg and Cultice (1997) in forecasting the need for medical doctors. The Health Resources and Services Administration's Bureau of Health Professions (BHPr) established a model that projects the needs for physician's decades into the future, using data from the 1989 National Hospital Discharge Survey, the 1980 National Medical Care Utilization and Expenditure Survey and the 1985 National Nursing Home Survey and assumed that recent trends shall continue in the future. The model identified the requirements in terms of physicians by projecting demographic-utilization-determined conditions for physician specialties (18 specialties). In other terms, the BHPr physician requirements model operates in a world where there are three intervening factors that are the population, the physician specialty and the care setting context. The simulation, according to Greenberg and Cultice (1997), is more useful for

monitoring trends and economic factors that are likely to affect the exploitation of medical specialist doctors than for providing policy implications. The simulation leads to the use scenarios to simulate the need for physicians. These scenarios include (A) population growth plus demographic change with enrollment patterns being constant, (B) free-for-service extreme or (C) the managed care extreme.

The ability to predict the need in terms of physicians and specialty is important in this model for two reasons: (1) when a specific specialty experiences a surplus of physicians, health costs increase, (2) a deficit in physicians is likely to keep underserved population (minorities mostly) lacking access to basic healthcare services (Greenberg and Cultice, 1997).

The sixteenth report done by the Council on Graduate Medical Education (COGME) also studies ways to make demand and supply of medical doctors converge in the US. The report's recommendations include the yearly increase in the number of physicians entering residency training from 24000 in 2002 to 27000 in 2015, the increase in total enrollment in US medical schools by 15% by 2015, the establishment of systems that track and re-assess the supply, demand, need and distribution of medical doctors and develop programs that would correct misdistribution of physicians, improve access to healthcare services for the underserved population, promote workforce diversity and appropriate specialty employment (COGME, 2005).

The RAND Europe report, in collaboration with the London School of Hygiene and Tropical Medicine, stresses the importance of healthcare planning that includes the long-term planning of the necessary number of medical doctors. The report develops and validates a structure that would assess and improve healthcare planning. The criteria of the structure include (1) vision, (2) governance and (3) intelligence (Fazekas et al., 2010). These assessment criteria do focus on planning as a process that involves several entities related to the health sector governance. The report is based on a literature that deals with planning in countries such as Germany, Austria, Canada and New Zealand. It is unrealistic to generalize the best practice over all countries studies because of differences in the countries' health systems in terms of complexity and diversity. It was found that planning in healthcare is determined by a range of institutional, political and cultural factors and that its success is influenced by the support of an appropriate governance

framework. Besides, planning in healthcare is also influenced by broader political goals (economic sustainability) as well as wider socio-economic context (Fazekas et al., 2010).

A study done to improve global health, by looking for successful health forecasting models and forecast health related variables for the next 50 years, shows that health outcomes are the result of influences from economic, demographic and education factors. The International Monetary Fund and the World Bank base their studied on the fact that national GDP per capita is one of the most important determinants of health. This has been proved through the study done by the physician Thomas McKeown who attributed 50% of the reductions in mortality in the studied period to improved living standards (Hughes et al., 2011). Being a new activity, modeling and forecasting health outcomes seems to focus on the disease and patient side of the equation by dealing with life expectancy and age-specific mortality forecasting through the Ifs work or model (Hughes et al., 2011). However, it is suggested that more focused modeling is being considered that connects forecasting with policy analysis and thus allows more planning in terms of sufficient density of health personnel. Besides, more modeling will include demographic, economic, environmental, sociopolitical and other systems (Hughes et al., 2011).

Table II.2.2.1: The Density of Human Resources for Health per 10000 people

Human Resources for Health category	Number	Density per 10000 population	Year
Physicians	**18269**	**5.92**	**2007**
Generalists	10006	3.24	2007
Specialists	8263	2.68	2007
Nurses	**22250**	**7.44**	**2004**
Registered nurses	11520	3.85	2004
Enrolled nurses	10730	3.59	2004
Midwives	**2078**	**0.7**	**2004**
Dentists	**3091**	**1.03**	**2004**
Pharmaceutical personnel	**7366**	**2.46**	**2004**
Pharmacists	7212	2.41	2004
Pharmacy technicians	154	0.05	2004
Physiotherapist	**377**	**0.13**	**2004**
Medical assistants	**356**	**0.12**	**2004**
Laboratory technologists	**827**	**0.28**	**2004**
Radiographer	**643**	**0.22**	**2004**
Environmental and public health officers	**737**	**0.25**	**2004**
Administrative and support staff	**9500**	**3.18**	**2004**
Skilled administrative staff	3200	1.07	2004

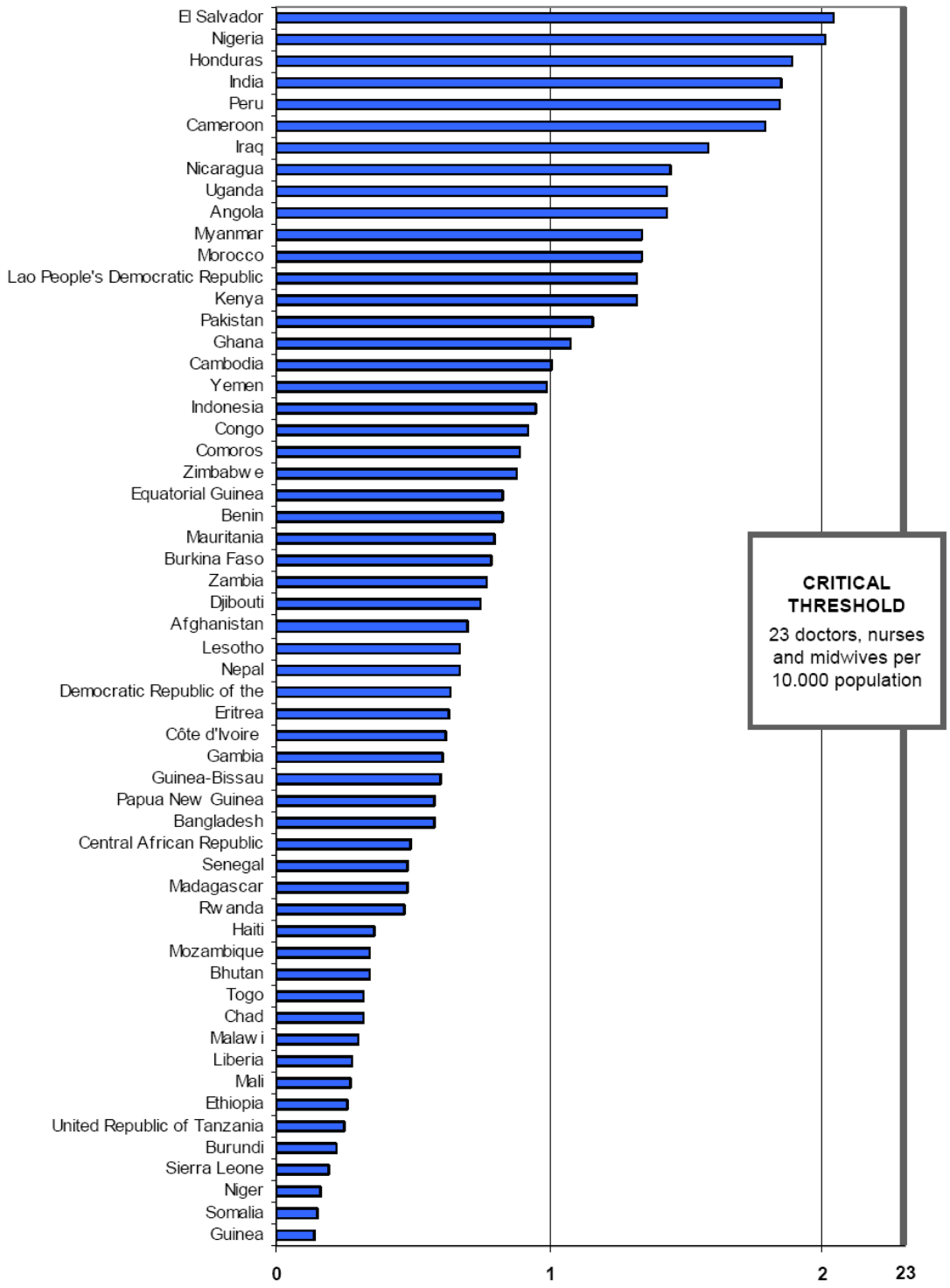
Other support staff	6300	2.11	2004

Source: Human Resources for Health Mapping, Eastern Mediterranean Region Observatory (EMRO, 2009)

In Morocco, the number of physicians per 10000 people was less than 6 in 2007 as shown in Table II.2.2.1 (WHO/EMRO, 2009). The World Health Report of 2006 also focused on the human resources needed to improve health and thus to help achieve the Millennium Development Goals (MDG) by 2015. So, in 57 countries, it was estimated that there is a shortage of around 2.3 million medical doctors, nurses and midwives (Figure II.2.2.1). Therefore, many countries including Morocco do have shortage in the number of physicians and need to measure their deficiency and model their future needs in terms of the medical personnel. The number of medical doctors in important in terms of preventing complications during birth and immunization programs (WHO, 2006).

Figure II.2.2.1: Density of doctors, nurses and midwives in the 57 countries with a critical health workforce shortage79

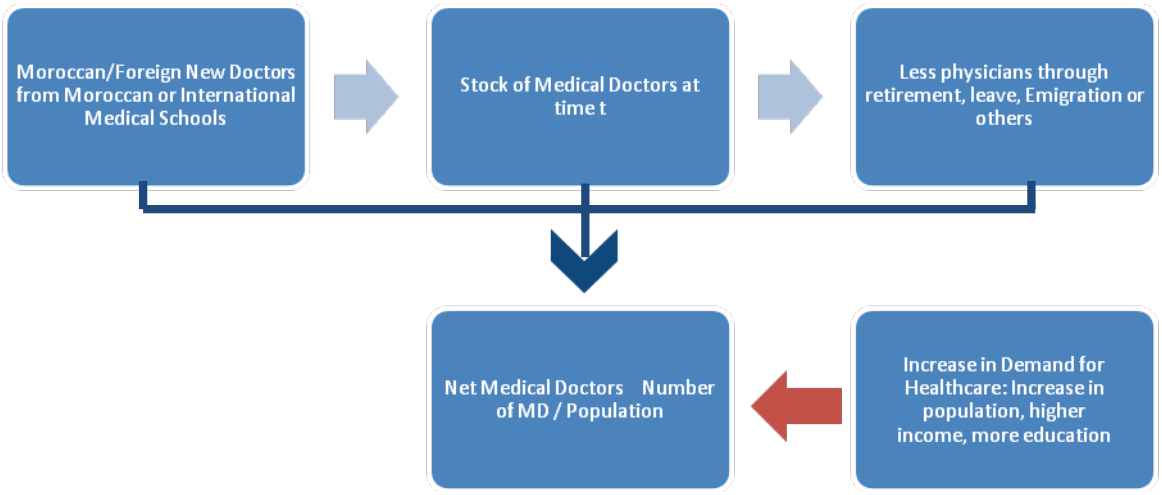
[79] WHO Global Atlas of the Health Workforce, November 2010: "Density of doctors, nurses and midwives per 10.000."



Besides, medical schools are very selective in Morocco and thus the number of medical graduates is not up to the general social and economic needs in Morocco. There are many factors that impact on the availability of enough physicians per population number. This can include the unavailability of doctors willing to work in faraway regions or in rural

areas, the case of doctors who retire, leave or emigrate as demonstrated in the following figure (Figure II.2.2.2).

Figure II.2.2.2: Stock of medical doctors at a given time



Scheffler et al. (2010) model can be a good start for the development of a Moroccan simulation projecting the number of medical doctors in 2015 or later. The model is based on the assumption that there is only one specialty which is being a medical doctors setting aside all the specialties. The data is based on WHO Moroccan databases and the Moroccan Ministry of Health regional health-related data. Data about economic growth, demographics, household income and regional (urban/ rural) development are also needed. The data used in the simulation covers the period of 1995-2009.

From Figure II.1 above, it is observed that stock of medical doctors in a given year depends on the inflows and outflows of physicians that happen that same year such as:

$$S_t = \int_0^t (Inflows - Outflows)ds + S_{t_0} \text{ or}$$

$$\frac{dS}{dt} = Inflows(t) - Outflows(t)$$

Where S_t is the stock of medical doctors at time t.

After determining the net of medical doctors, the projected developments in term of demand for health care should be taking into consideration to measure its impact on physicians' need. The Moroccan minister of health explained that the number of medical,

paramedical and administrative staff increased by 20.6% from 2007 to 2009 and announced the creation of 2000 new positions under the current finance bill. In addition, the ministry started a new health care plan to train 3300 doctors by 2020 (Magharebia, 2010).

Data and Method

In order to achieve the planned number of medical doctors by 2015 (MDGs), 2020 or later, it is necessary to define the trends of the most important variables influencing the results. The number of medical doctors in Morocco in a yearly basis is needed. The Moroccan Ministry of Health "Santé en chiffre 2009" provides the number of medical doctors (specialists and generalists) in 2009. The values of this variable during 1999-2007 are provided by the Global Health Workforce Alliance (2010) from the Ministry of Health[80]. The stock of medical doctor migrants is also needed in a yearly basis. It is retrieved from the Docquier and Bhargava (2006) database about medical brain drain from 1999 to 2004. The rate of retirement is assumed to be a yearly average of 2.5% and is computed directly from the number of medical doctors. In 2005, the number of retiring medical doctors is increased by 371[81] because of the voluntary leave campaign that took place that year when 236 specialists and 135 generalists voluntarily retired (Boudarham, 2005). Therefore, the yearly addition to the number of medical doctors can be computed as the new number minus the actual number of medical doctors plus the number of retired doctors and migrant doctors (Appendix: Table A.1). The value of total population is also needed in a yearly basis. The values were retrieved from the World Bank (WB) data bank[82] for the period 1999-2009 and from the Human development Report for 2010 value and projection values of 2015 and 2020[83].

It is then possible to compute the number of medical doctors per 10000 people on a yearly basis. There is also the distribution of the population over the Moroccan land that can be needed when assessing the distribution of medical doctors over the rural and urban

[80] GHWA – Global Health Workforce Alliance (2010).
[81] http://www.wladbladi.com/forum/info-bled/7533-maroc-recrutera-medecins-etrangers.html
[82] http://databank.worldbank.org/ddp/home.do
[83] http://hdr.undp.org/en/reports/global/hdr2010/

areas of Morocco. It is computed yearly given the Moroccan area of 446300 square Km of land[84] and the total population each year.

The other set of variables includes economic, health education and growth data that would be used as inflows into the model (Appendix: Table A.2). The values of GDP (US$) and GDP per Capita (US$) are retrieved from the World Data Bank of the WB. The values of the Gross National Income per Capita are also retrieved from the World Data Bank on a yearly basis from 1999 to 2009. In addition, data about the urban population values as percentage of total population is also retrieved on a yearly basis from the World data bank (WB, 2010). Health expenditures per Capita (PPP US$) values are taken on a yearly basis from the Human Development Reports of 2006, 2005, 2004, 2003 and 2002 for the period 2000-2004. Then, the number of graduates in health is also taken from the World data bank (WB) for the years 2001 and 2005-2009 and includes all human resources for health.

The idea is to define the trends of the different variables that are either inflow of outflows that influence the rate of physicians per population. After doing the back-casting, the trends will allow the forecasting of future values till 2030 in this paper. The trends are defined for key variables in Table II.2.2.2 by conducting some linear regressions on the yearly data where X represents a yearly index.

Table II.2.2.2: Trends of key variables

Variable	Equation	R^2	Obs.
Medical Doctor Number	$MDNumber = \underset{(231.178)}{12898.52} + \underset{(41.93)}{684.69}(X)$	0.9672	10
Medical Doctor Migrants	$MDMigrants = \underset{(175.26)}{1844.76} + \underset{(20.999)}{73}(X)$	0.9888	6
Total Population	$TotalPOP = \underset{(88.98)}{27.6} + \underset{(15.388)}{0.3859}(X)$	0.9402	16
Urban Population (% of Total)	$UrbanPOP = \underset{(81.54)}{51.2974} + \underset{(11.63)}{0.5916}(X)$	0.8995	16
Health Expenditures per Capita (PPP $)	$HealthExpend = \underset{(19.58)}{174.4} + \underset{(3.8225)}{13.9}(X)$	0.7729	5
GDP per Capita (Current US $)	$GDPperCapita = \underset{(10.65)}{938.09} + \underset{(11.7564)}{159.5036}(X)$	0.9258	12
GNI per Capita (PPP int. $)	$GNIperCapita = \underset{(51.43)}{2310} + \underset{(27.08)}{205.64}(X)$	0.9865	11

[84] The land area of Morocco is 446300 Km^2 based on the computation of the World Bank data bank.

Health Graduates (000s)	$HealthGraduates = \underset{(1.03)}{64.55} + \underset{(4.61)}{38.795}(X)$	0.8018	6

The observed past trends are then projected into the next 30 years approximately to provide an idea about the outcomes of health given the movement of some variables such as migration and retirement of physicians. The forecasted number of medical doctors addition for the year 2015 (4204) is greater than the wished for number of 3300. However, this is just a projection of past trends where other variables, such retirement rate, were assumed not to not change over the years.

Within the above context that shows clearly the trands taking place in Morocco and the prospects assigned to medical doctors, a survey is administered in order to reveal perceptions and attitudes towards migration.

II.2.3 Perception by Moroccan Physicians of Factors Affecting Migration Decisions

The variety of factors affecting migration decisions of medical doctors are confronted to the opinions of medical doctors operating in Morocco. The major objective of this exercise is to see how individual and environmental factors are perceived by each medical doctor who has selected to stay or to return to the country of origin after his or her medical studies. The method used in this research is based on the analysis of the information and data from a survey of physicians. This survey is based on the inputs from 117 medical doctors operating in different cities of Morocco. The results reveal that those with lower age and higher difficulties to practice constitute most of the medical doctors to relocate overseas. The study reveals also that labor wages, gender, the status of the hospital (private or public), the situation prevailing in hospitals, and migration conditions do not significantly affect the attitude of respondents about migration. These results confirm that the surveyed doctors have selected to not migrate but to operate in Morocco while those that migrate could have opposite assessments for the same factors.

The problem of human capital flight, more commonly referred to as "brain drain", has been widely discussed all over the world in recent decades. The reasons for such phenomenon usually include two aspects which come from both source and host countries. With regard to source countries, the reasons may include lack of opportunities,

political instability, economic depression, health risks, ambition for an improved career, and so on. In host countries, the reasons are mainly rich opportunities, political stability and freedom, developed economy, better living conditions, etc. Brain drain is usually regarded as an economic cost, since emigrants usually take with them the portion of value of their training sponsored by governments or other organizations (Linacre, 2007). Developing countries are most suffering from the migration of skilled individuals. Brain drain is often associated with de-skilling of emigrants in their country of destination, while their country of emigration experiences the draining of skilled individuals. One very common aspect of brain drain is the migration of health personnel in search of a better quality of life, higher salaries, access to advanced technology and more comfortable conditions. This migration of health professionals is of growing concern all over the world because of its negative impact on health systems in developing countries. These countries loose huge investments in the education and training of young health professionals as a result of migration.

Shortages and imbalances of medical personal have been recently regarded as an international problem (Marchal & Kegels, 2003). Data from OECD (Organization For Economic Cooperation and Development) countries show that medical doctors trained abroad make up a significant percentage of the medical core in most of these countries: 21% in Australia, 23% in Canada and 9% in Finland (Kumar and Simi, 2007). In 1972, about 6% of the world's health professionals (about 140 000) settled down outside their countries of origin. Over three-quarters were found in only the USA, UK and Canada. The main exporting countries included: India, Pakistan and Sri Lanka (Dodani and LaPorte, 2005). Dodani and LaPorte (2005) convey also that the countries that produced more physicians than they had the capacity to absorb were identified as Egypt, India, Pakistan, Philippines and South Korea. Even though, the lack of reliable data and difficulties in defining whether a migrant is 'permanent' or 'temporary' still exist.

As many countries in the MENA region, Morocco as well suffers from the migration of medical professionals. OECD statistics (2000) show that Morocco has the second highest expatriation rate in the MENA region, after Lebanon. Algeria, Iraq, Syria, and Egypt

have also high expatriation rates according to OECD data[85]. Docquier, Bhargawa, and Moullan (2010) used total physician emigration rate in a country as the ratio between the stock of national physicians working abroad and the number of physicians trained in the home country, excluding doctors trained in host countries. They indicate that for 2009, Lebanon and Syria had the highest emigration rate with respectively 19.6% and 17.5% followed by Jordan (9.9%), Algeria (7.1%), Morocco (6.6%), and then Egypt (5.6%). Relatively, Clemens and Patterson (2006) accounted for the physicians born in MENA but trained abroad. Their results suggest that 44% Algerian, 31% Moroccan and 33% Tunisian medical doctors practice abroad. These results suggest that the migration of medical professionals is increasingly regarded as a serious problem in Morocco, as in other countries in the MENA region.

Previous literature suggests that financial reasons are the most important motivating factor for doctors who relocate to overseas destinations (Kumar and Simi, 2007; Dodani and LaPorte, 2005). Other literature suggest other factors such as working conditions and political instability as the main reasons leading to medical doctors migration (Docquier and Bhargawa, 2007).

This sub-part of this research project is designed to investigate the reasons leading to doctors' migration in the Moroccan context. Throughout the study, 117 medical doctors responded to a questionnaire that is designed to capture Moroccan medical doctors' response to the theoretical model of the new economics of skilled labor migration. The model tests for both MENA and Eastern European countries and uses variables related to relative wages, employment incentives and behavioral parameters.

II.2.3.1 Data Analysis and results

The questionnaires were filled by 117 medical doctors in different cities in Morocco, including Rabat, Azrou, Meknes, Khemissat, Tifelt, and other cities. The questionnaire is composed of 26 questions; some of the questions are descriptive questions and the others tend to investigate the relationship between several variables and respondents' intention to immigrate and work outside Morocco, as discussed in the next sections.

[85] OECD (2010) and WHO (2010).

1. Gender VS Intention to Migrate

As shown in figure 1 (in the Appendix), respondents are of both genders with 60% males and 40 % females. With regard to migration, a descriptive analysis (as shown in figure 2 in the Appendix) suggests that 74% of females and 77% of males have intention to migrate. So, the percentage of males with intention to migrate males is slightly higher than that of females. The questionnaire data indicates also that 14 (out of 70) of males got their degrees from abroad while only 1 female (out of 47) got her degree from a foreign country. This can be explained by the fact males have higher ability to travel and live outside home countries. Piper (2005) reveals that the percentage of males who migrate at the international level for the period 1960-2000 is higher than that of females. In order to test whether gender really affect respondents' intention to migrate, a chi-square test is performed with intention to migrate (yes or no) and gender as two categorical variables. The questionnaire Statistics indicate that 76% of the medical professionals included in this study have intention to migrate, while 29% have already started migration application procedures. These latters have different destinations as indicated in figure 3 (in the Appendix). Throughout this study, Intention to migrate is a dummy variable that indicate whether the respondent has an intention to migrate or not.

Results

The results of the Chi-square test are displayed in the table below:

Table II.2.3.1: Chi-square test output for Gender VS **Intention to Migrate**

Chi-Square Tests				
	Pearson Chi-square Value	Degrees of freedom	P-value	Confidence interval
Pearson Chi-Square	.111[a]	1	.740	95%

As shown in table 1, the p-value for the chi-square test is largely greater than 0.1. This suggests that there is no significant relationship between Gender and intention to migrate. In other words, there is no difference between males and females when deciding about whether to migrate or not. So, the results are do not support the alternative hypothesis that suggest that males have more intention to migrate than females.

2. Age and intention to Migrate

Respondents in this study are of different ages. So, as shown in figure 4 (in the appendix), 26% of respondents' ages are between 25 and 30 years old, 49% between 31 and 45 years old, and 25% are above 46 years old. It is expected that young people have more intention to migrate for many reasons, including health, less responsibilities, and higher motivation to make a good career even outside home countries. In order to test this assumption, a logistic regression is performed with age as an independent variable and intention to migrate as a dependent variable (a dummy variable). The independent variable "age" is the average age for each age category.

Results

The results are shown in the following table.

Table II.2.3.2: Logit regression Output (Age VS Intention to migrate)

Regression Output			
	Coefficient	df	P-Value
Age	-.043	1	.071
Constant	2.854	1	.004

The results show that there is a significant causal relationship between age and intention to migrate (P-Value < 0.1). So, age is negatively related to intention to migrate (coefficient = -0.43). These results support our initial hypothesis and suggest that the higher the age of the medical doctor, the less is his intention to migrate.

3. Workplace and salaries

Respondents to this questionnaires work in public as well as in private hospitals. The questionnaire data indicate that 26% of respondents work in private hospitals (or have their own cabinet) and 74% work in public hospitals (as shown in figure 5 in the appendix). The Data show also that 42% of respondents are general practitioners while 58% are specialists (as shown in figure 6 in the appendix).

One of the questions in the survey is about the rating of current salaries of respondents (very good, good, or poor). The records, as shown in figure 7 (in the appendix), indicate that 62% of respondents rate their current salaries as poor, 27% as good, and 4% as very good. The remaining 7% did not answer to this question. However, the rating of current

salaries differs according to the workplace and the specialty of medical doctors. Figure 8 (in the appendix) shows that for medical doctors practicing in private, 48% rate their salaries as good, 29% as poor, and 23% as very good. For medical doctors practicing in the public sector, 76% rate their salaries as poor, and 24 % rate it as good. Hence, one might conclude that medical professionals working in the public sector are less satisfied with their salaries than those working in the private sector. The data suggest also that the current salary rating differs according to the specialty of the medical professional. Figure 9 (in the appendix) indicates that for specialists, 66% rate their salaries as poor, 22% rate it as good, and 6% as very good (the remaining 6% did answer to the questions). For general practitioners, 56% rate it as poor, 33% rate it as good, and 2% as very good (the remaining 9% did not respond to the question). The results shown in figure 9 suggest that the specialty of the doctor is not significantly related to the rating of salaries.

4. Workplace and intention to migrate

In the previous section, it was suggested that medical doctors practicing in public hospitals are less satisfied with their salaries than those working in the private sector. Based on this finding, one might assume that medical professionals working in the public sector might have higher intention to migrate than those working in private clinics. In order to test the relationship between workplace (private or public sector) and intention to migrate (yes or no), a Chi-square test is performed with the two categorical variables workplace (public or private) and intention to migrate (yes or no).

Results

The results are indicated in Table II.2.3.3 below:

Table II.2.3.3: Chi-square test output for Workplace VS **Intention to Migrate**

Chi-Square Tests				
	Pearson Chi-square Value	Degrees of freedom	P-value	Confidence interval
Pearson Chi-Square	2.489[a]	1	.115	95%

As shown, the p-value for the chi-square test is greater than 0.1. This suggests that there is no significant relationship between the workplace and intention to migrate. In other

words, working in a public hospital or a private one does not affect the respondent's intention to migrate.

5. Rating of Salaries and intention to migrate

It is expected that financial reasons are the most important motivating factor for doctors who relocate to overseas destinations (Kumar and Simi, 2007). So, salaries might be a key factor leading to migration. In order to test whether the rating of current salaries is related to the intention to migrate, a Chi-square test is performed with salary rating and intention to migrate as two categorical variables.

Results

The results are displayed in the following table:

Table II.2.3.4: Chi-square test output for Salary rating VS **Intention to Migrate**

Chi-Square Tests				
	Pearson Chi-square Value	Degrees of freedom	P-value	Confidence interval
Pearson Chi-Square	4.649[a]	3	.199	95%

As indicated, the p-value for the chi-square test is significantly greater than 0.1. This suggests that there no significant relationship between the rating of salary and intention to migrate. Hence, even respondents who rate their salaries as good or very good might have intention to migrate, so, based on the results of this study, salaries are not the main reason for migration as suggested by (Kumar and Simi, 2007).

6. Difficulty in treating patients and intention to migrate

An important factor that might be leading to migration is the circumstances under which the medical doctor works. Many medical doctors complain about the circumstances in Moroccan hospitals. When asked, about their desired changes in hospitals, the majority of respondents specified 3 or more changes to be accomplished. A following question in the survey asked respondents to rate the difficulty they find in treating patients on a scale from 0 to 10, with 0 as finding no difficulty and 10 as highly difficult. In order to test whether finding difficulties in treating patients affect physicians' intention to migrate, a logit regression is performed with difficulty score as an independent variable and intention to migrate as a dependent variable.

Results

The results are given below:

Table II.2.3.5: Logit regression Output (Difficulty in treating patients VS Intention to migrate)

Regression Output			
	Coefficient	df	P-Value
Difficulty in treating patients	.182	1	.010
Constant	.376	1	.283

The P-value is smaller than 0.10 and the coefficient is equal to 0.182. This suggests that the score of difficulty of treating patients is positively related to the respondents' intention to migrate. In other words, medical doctors facing difficulties in treating patients have more intention to migrate. So, facing difficulties in treating patients can be considered as one of the reasons leading medical professionals to migrate.

7. Desired changes in Moroccan hospitals and intention to migrate

One of questions in the survey asks respondents to suggest their desired changes in Moroccan hospitals. The number of desired changes differs from one respondent to another. The desired changes include: more nurses (89% of respondents), more doctors (74%), higher salary (72%), more medical staff (68%), better equipment (18%), and computers (15%) (figure 10 in the appendix). So, it is assumed that the higher the number of desired changes in hospitals, the less the respondent is satisfied with the current situation of the health sector in Morocco. Hence, respondents with more desired changes might have higher intention to migrate. In order to test this hypothesis, a logit regression is performed with the number of desired changes as an independent variable and the intention to migrate as a dependent variable.

Results

The results are indicated in table II.2.3.6.

Table II.2.3.6: Logit regression Output (Number of desired changes in hospitals VS Intention to migrate)

Regression Output			
	Coefficient	df	P-Value
# of desired changes in hospitals	-.014	1	.938

Constant	1.206	1	.07

As indicated above, the p-value for the coefficient is largely greater than 0.1. This suggests that the number of desired changes in hospitals does not affect the respondent's intention to migrate. So, even if the respondent suggests many changes to be applied in hospitals, he might not be willing to migrate to another country, the current situation of hospitals does not push medical doctors to migrate. Actually, while filling the questionnaires many medical doctors stated that though the hard circumstances in the Moroccan health sector, they don't think about migration to another country.

8. Migration conditions disturbing medical doctors and intention to migrate

In the previous sections, the study investigated the reasons encouraging medical professionals to migrate. However, one question in the survey asked respondents about the migration conditions that might disturb them or even make them decide to not migrate. The questionnaire records (as shown in figure 11 in the appendix) indicate that the main migration conditions bothering respondents and that might limit respondents' intention to migrate are equivalence test (56% of respondents), readmission into the host country (44%), partner and child terms (43%), and salaries (17%). It is expected that these factors have a negative effect on respondents' intention to migrate. So, the higher the number of migration conditions disturbing medical professionals, the lower will be their intention to migrate. In order to test whether these factors are related to respondents' intention to migrate, a logit regression is performed with the number of conditions mentioned by respondents as an independent variable and intention to migrate as a dependent variable.

Results

Table II.2.3.7: Logit regression Output (Number of migration conditions disturbing respondents VS Intention to migrate)

Regression Output			
	Coefficient	df	P-Value
# of migration conditions disturbing respondents	.679	1	0.003
Constant	.216	1	.547

These results suggest that the number of migration conditions disturbing respondents do not negatively affect their intention to migrate, as was expected. So, even if respondents do not agree with a high number of migration conditions, they always have an intention to migrate. This can also explain the fact these medical are still practicing in Morocco though they have intention to migrate. So, if these migration conditions are reduced or cancelled, the number of medical doctors migrating might increase even more.

II.2.3.2 Discussion of results

As stated earlier, the main objective of this study is to investigate the reasons leading to medical doctors' migration in Morocco. This is accomplished through a survey of 117 Moroccan medical doctors working in public and private hospitals in different cities (Azrou, Meknes, Rabat, Tiflet, Khemisset, Casablanca and others).

First, the paper investigates the potential effect of gender on respondents' intention to migrate. Previous literature suggests that females have less intention to migrate males do (Piper, 2005). In order to statistically test the gender effect on respondents' intention to migrate, a chi-square test is performed with intention to migrate (yes or no) and gender as two categorical variables. The results of the analysis reveal that gender has no significant statistical effect on respondents' intention to migrate. Hence, males and females are alike with regard to intention to migrate and there might be other factors that can affect medical professionals' intention to migrate.

Another factor that might have a strong effect on medical doctors' intention to migrate is age. Previous studies indicate that young people have generally more intention to migrate for many reasons, including superior well-being and strength, fewer responsibilities, and higher motivation to better jobs even outside home countries (Piper, 2005; Docquier, Bhargava, & Moullan, 2010). In order to test whether age affect medical professionals' intention to migrate, a logit regression is performed with age as an independent variable and intention to migrate as a dependent variable. The results suggest that age is negatively related to respondents' intention to migrate. In other words, younger medical doctors have more intention to migrate and work abroad.

Respondents in this study practice in both public and private hospitals. In general, public and private hospitals differ in terms of equipment, number of medical staff, financial situation of staff, and other characteristics. These differences between private and public hospitals might affect intention to migrate within medical professionals practicing in the two kinds of hospitals. In order to test the relationship between workplace (private or public sector) and intention to migrate (yes or no), a Chi-square test is performed with the two categorical variables workplace (public or private) and intention to migrate (yes or no). The results reveal that there is no significant relationship between the workplace and intention to migrate. In other words, working in a public hospital or a private one does not affect the respondent's intention to migrate.

Kumar and Simi (2007) indicate that financial reasons are the most important motivating factor for doctors who relocated to overseas destinations. In order to investigate this assumption, respondents were asked to evaluate their current salaries as very good, good, or poor. To assess whether the rating of current salaries is related to the intention to migrate, a Chi-square test is performed with salary rating and intention to migrate as two categorical variables. The chi-square test results suggest opposing results to what was suggested by (Kumar and Simi, 2007) and reveal that rating of salaries does not affect respondents' intention to migrate.

A further important factor that might be leading to migration is the circumstances under which the medical doctor works. The health sector in Morocco has been widely criticized by medical doctors. The last manifestations in Rabat are a good evidence of medical professionals' dissatisfaction about their current situation. The survey asked respondents to rate the difficulty they find in treating patients on a scale from 0 to 10, with 0 as finding no difficulty and 10 as highly difficult. In order to test whether finding difficulties in treating patients affect medical professionals' intention to migrate, a logit regression is performed with difficulty score as an independent variable and intention to migrate as a dependent variable. The results suggest that the score of difficulty in treating patients is positively related to intention to migrate. In other words, facing difficulties in treating patients increases respondents' intention to migrate.

Finally, the questionnaire records reveal that the migration conditions factors that bother respondents and therefore might limit their intention to migrate include equivalence test (56% of respondents), readmission into the host country (44%), partner and child terms (43%), and salaries (17%). The assumed hypothesis reveals that these migration conditions have a negative effect on respondents' intention to migrate. So, the higher the number of migration conditions disturbing medical professionals, the lower will be their intention to migrate. In order to test whether these factors are related to respondents' intention to migrate, a logistic regression is performed with the number of conditions mentioned by respondents as an independent variable and intention to migrate as a dependent variable. The results suggest that these migration conditions do not negatively affect respondents' intention to migrate. Even though, such conditions might be the reason pushing these respondents to still practice in Morocco even if they have intention to migrate.

Conclusion

When looking closely to a specific country (Morocco) of the MENA region, it appears that local needs of healthcare are increasing. Furthermore, enhancements in quality of health services are also expected. This is happening under the effects of demographic changes, income enhancement and urbanization but also with the promotion of social programs. While these demand side impacts are progressively increasing in the future, the supply side is also diversifying the means of providing better services. In this process, while medical research needs to be emphasized, the deficit in medical doctors is considered on medium term, to be increased. Medical education and research are then becoming central parts for satisfying the pressure from increased health demand. When accounting for the emigration of medical doctors, the pressure of demand becomes even more important. Away from health technologies that need continuous updating, human resources and especially medical doctors and human expertise appear to be crucial. The cooperative frameworks with other countries and mainly with the EU and the countries composing it can be an important source for satisfying both the needs of the EU and those

of Morocco. In this process, research and education in the medical area can be the core for the acceleration of bilateral and multilateral exchanges in health services.

The reasons leading Moroccan medical professionals to migrate are also investigated through a survey. The results suggest that age and difficulties in treating patients are the most important reasons for this particular group of doctors to relocate overseas. This reveals also that salaries, gender, and workplace (private or public hospitals), current situation of hospitals, and migration conditions do not significantly affect respondents' intention to migrate. In order to prevent the loss of medical expertise from a society already in need of quality healthcare, government and society acts are highly recommended. Such countries may be seen as loosing large investments in the training and education of young physicians as a result of migration. On the other side, the new idea of win-win model suggests that both sending and receiving countries can share and work jointly for the improvement of medical education and research in order to strengthen attraction of medical doctors to both North and South. This suggests that the new economics of migration of medical doctors is really a promising theoretical, empirical and a practical framework. It does provide strong grounds for the strengthening of North-South collaboration in the area of health care and medical doctors through education and research.

Part III: A Win-Win Collaborative Framework & North-South Cooperation

This last part of this research report is conducted in two interdependent steps. The first one focuses on the global health system that has been conducted worldwide and that is likely to have facilitating functions for further worldwide and regional cooperation. The second shows mainly the likelihood of the gains to occur in both South and North of the Mediterranean area through further collaboration in medical education and research.

III.1 Migration of Medical Doctors and the Global Health System

The past decades have witnessed an increase in the pace and a consolidation of migration of medical doctors and the globalization of the health system. If properly managed, globalization of the health workforce could lead to perceptible gains in health status for all parties involved. Where markets are non-exclusionary, regulatory institutions strong and safety nets in place, globalization could enhance the performance of countries with a good human and physical infrastructure. This sub-part reviews the importance of migration and aims at presenting a different view on migration of medical doctors. While the traditional view has been dominated by the rhetoric on "brain-drain," a new and more promising trend of research has centered on the relatively new concept of "brain-circulation" and new economics of skilled labor migration. Mobility for medical workers, and health workers, in general, can be a significant contributor to the formation of scientific and technical human capital, which has been an important driver in economic expansion and social development in many regions of the world. To illustrate this, an overview of the major dimensions related to the global health systems are described and discussed. The findings show that the trends taking place globally are promising for an enhanced cooperative framework where both developing and developed countries benefit from the new outcomes of the new economics of skilled labor migration. Circular migration can be seen as a means to account for the emerging knowledge economy where medical education and research can be major drivers. The global health system provides avenues for achieving mutually higher outcomes. While this chapter focuses on the global health system, the following one discusses the cooperative framework.

This sub-part investigates questions that are relevant to the public policy debate on the implications of migration of the sending country. The first issue that is tackled is to try and detangle the complex and diverse web of linkages between globalization and population health as well as the challenges faced by public policy makers and health practitioners. Second, the implications of the migration of medical doctors, and skilled health workers, in general, on the country of origin are investigated. A wide set of literature and of numerical examples from different parts of the world are reviewed. Third, the motives for medical migration necessary for the formulation of an adequate public policy are investigated.

The migration of highly qualified personnel is a phenomenon that has accelerated tendency during the past decades and has generated a wide spread debate. One strand of

research has focused on what is termed "brain drain." It emphasizes how the globalization of the world economy is shaping the patterns of global health, and has generated an uneven distribution of the costs and benefits depending on the direction of the migration flux. The host countries benefit from (i) a short term relief of labor shortages, (ii) an added value in terms of R&D, (iii) more tax and social security revenues and (iv) an increased competitiveness. The sending country on the other, registers (i) a loss in its medical staff, (ii) a loss on the return to investment in education, (iii) a loss in tax and social security revenues, (iv) higher salaries in the medical sector and overall, a deeper poverty. The other strand of research has been shaped by a more active view on immigration. Under the umbrella of the World health system, this strand builds on the cooperative framework and coalition to advocate that immigration can benefit both the sending and the receiving countries. This is mainly based on the theoretical contributions from the new economics of skilled labor migration.

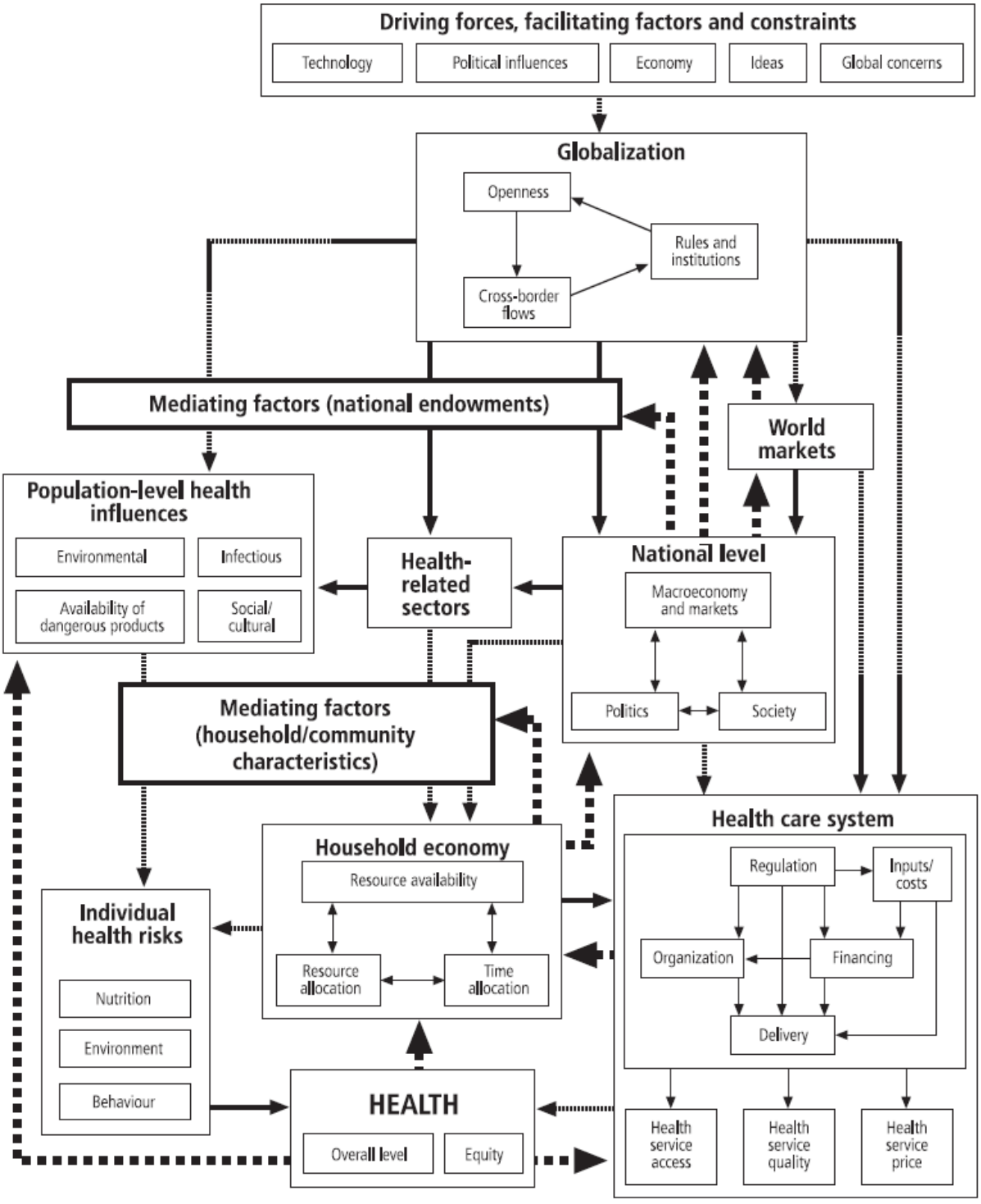
III.1.1 Globalization and Health: A diverse web of linkages

The pathways from globalization to health have been assessed in conceptual frameworks by a multitude of authors and frameworks. One strand of this research focuses on the impact of globalization of population health, for example, Woodward et al., (2001), Labonte and Togerson (2003), Labonte et al., (2007) and Huynen et al. (2005). For a selective critique of some of the most cited frameworks, see Labonte and Torgerson (2003). Another strand, centers on establishing the impact of globalization on the social determinants of health (for example, Lee et al. (2007).

Woodward et al. (2001) identify five factors that map the links from globalization to population health. Three of these factors are direct and the two others operate in an indirect way as illustrated in figure III.1.1. The direct effects comprise effects of international organization such as the WTO and the General Agreement on Trade in Services (GATS), for example, on national health systems and policies, especially through price setting. Another direct effect resides in the cross border transmission of disease threats and the marketing of a life style such as smoking, for example. The two indirect effects are vehicled mainly through economic channels (Labonte and Torgerson, 2003). Lee (2004) links globalization to health via three channels. First, globalization has

changed the notion of *space*, where for example the pandemic issue of HIV has made the richer countries fear migration that could be infected. Second, temporal changes facilitated by the modern transportation means has made it easier to move around and spread threats. Lastly, the cognitive changes that the global mass media and advertising industry have shaped aspirations and ethical values that cross national boundaries. All these factors contribute to making it more demanding on the local authorities to face up to the demand of their nationals.

Figure III.1.1: Framework for Globalization and Health

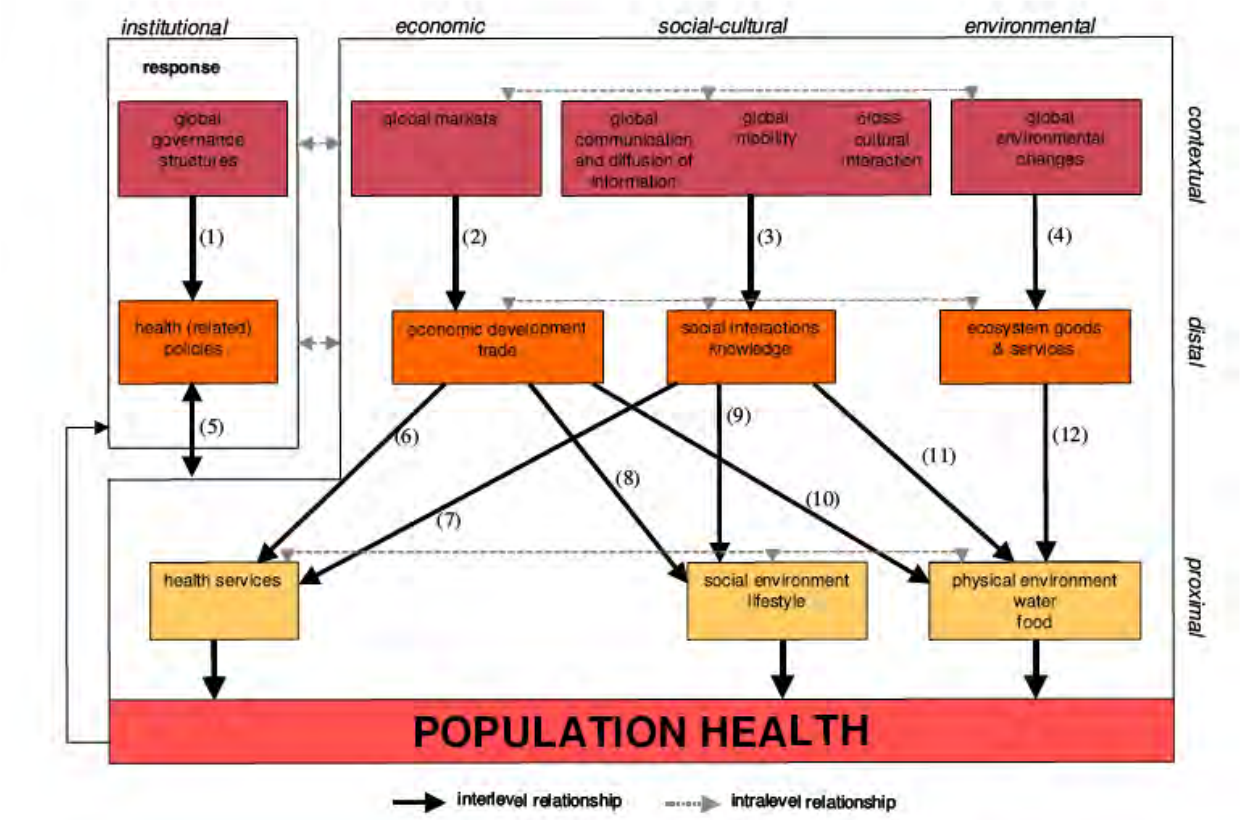


Source: Woodward et al. (2001, Fig. 2.)

In an attempt to evaluate all potential contributing factors and provide a more comprehensive approach to the interlink between the determinants of health and their

implications on health, Huynen et al. (2005) build a multilevel conceptual framework which connects the determinants of globalization to population health, as demonstrated in figure III.1.2.

Figure III.1.2: Model of linkages and globalization of health



Source: Huynen et al. (2005, fig. 3)

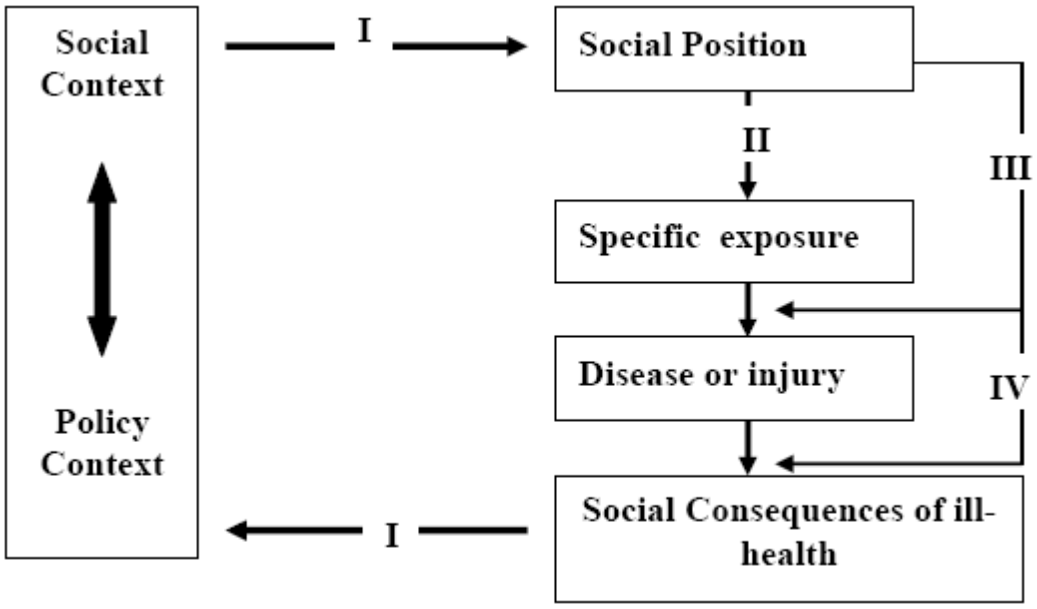
In their attempt to a more global approach, Huynen et al. (2005) identify three strata of factors that would lead to a given health outcome: (i) contextual factors, (ii) distal determinants and (iii) proximal determinants. The first set of factors, the contextual factors relate to the global (a) governance structure, (b) markets and communication means, (c) mobility, (d) cultural flows and (e) environmental changes. The second set of factors, or the distal factors, can be summarized in (a) health and health related issues, (b) income and wealth distribution and trade in goods and services, (c) education and literacy and (d) habitat and information. The third and last set, the proximal determinants, is

formed by (a) the quality and access to health services, (b) lifestyle, (c) social environment, (d) food and water and (e) quality of the living environment.

This conceptual framework for globalization and population health has a hierarchical nature whereby the contextual factors influence the distal factors, which in turn affect the distal factors shape the proximal health determinants. In the last phase, the distal factors would directly influence population health. In this framework, population health is, therefore, a complex and stratified system that derives from the interaction at the three levels of the economic, institutional, socio-cultural and ecological factors.

Diderichsen et al., (2001) devise a system of four mechanisms through which health inequalities can be generated (figure III.1.3). The first is social stratification, which means simply the "social position" of every citizen in a hierarchical society. The second mechanism is differential exposure, i.e., the difference between social groups in a stratified society may lead to different degrees of exposure to health risks, such as toxic exposure. Third, the differential vulnerability, which refers to the accumulated outcome from the previously cited mechanisms, in this case, a lower social position and a larger exposition to health hazards would naturally lead to greater health vulnerability. Finally, differential social and economic consequences of ill health- i.e., income inequality and the consequent social position and exposure lead to an unequal distribution of ill health within a stratified society. Globalization can affect health via any of these mechanisms. The authors also present means by which the public policy makers could reduce health inequalities.

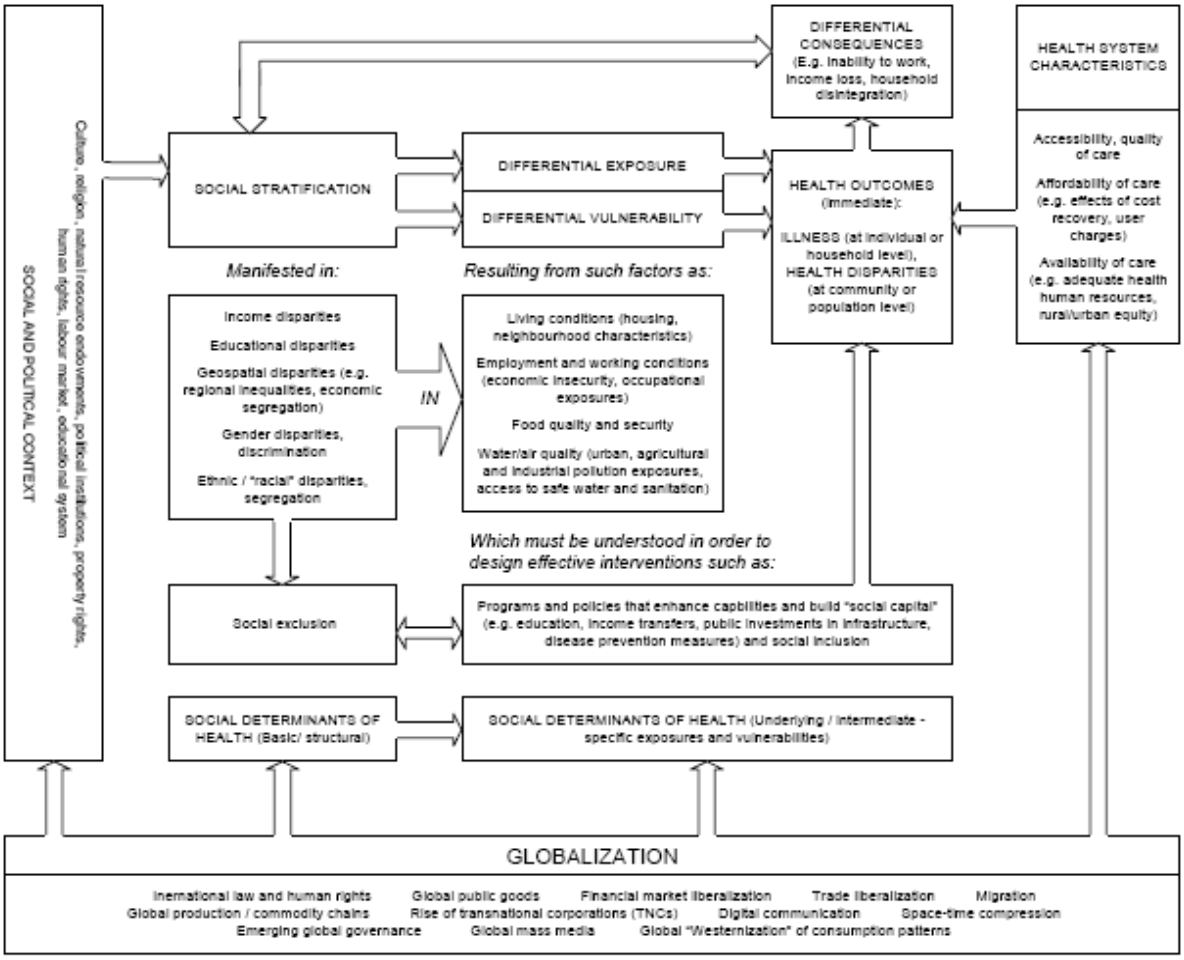
Figure III.1.3: Social stratification and disease production



Source: Solar O, Irwin A (2005)

Schrecker and Labonte, (2006) extended on the framework by built by Diderichsen et al., (2001) and that of Solar and Irwin (2005) to summarize keys findings in the literature and to introduce recommendations from the Commission on Social Determinants of Health (figure III.1.4). In their extended version, Schrecker and Labonte (2006) focus on the most important determinants, among which (i) the structural as opposed to the intermediate determinants; (b) the socio-political context; and (c) levels of health inequities that need to be targeted in the first place.

Figure III.1.4: Globalization and the social determinants of health



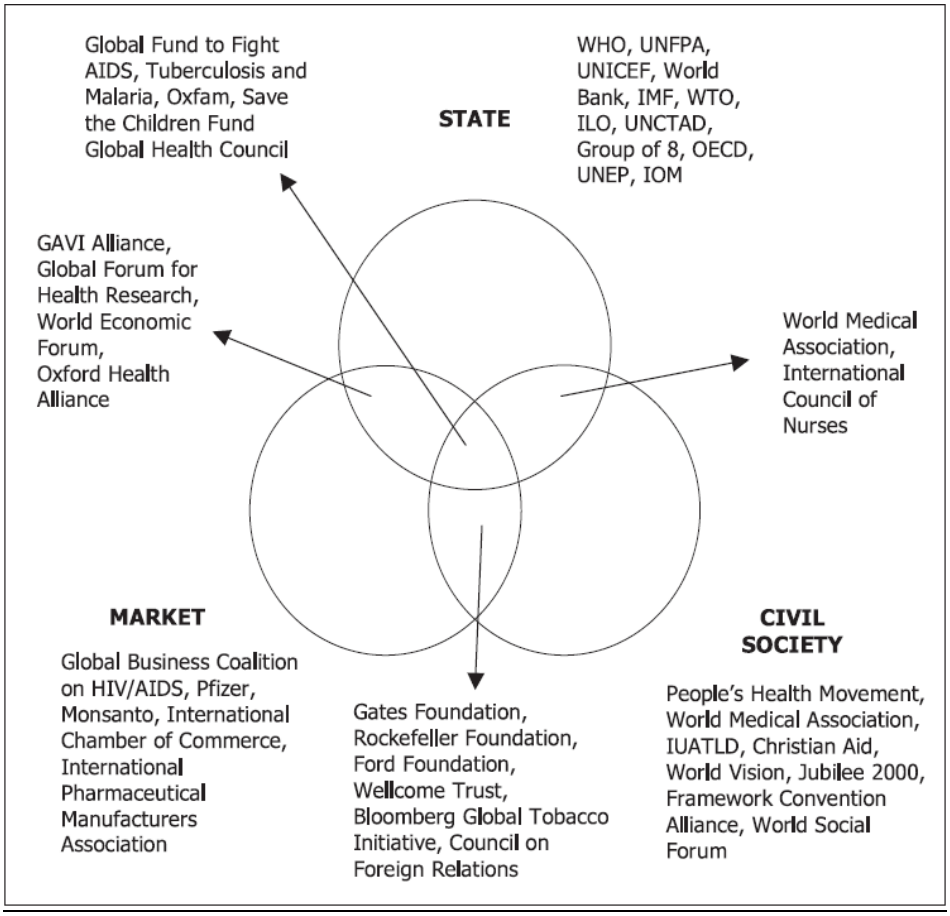
Source: Developed by Schrecker and Labonte, (2006) based on Diderichsen et al. (2001) and refined by Solar & Irwin (2005) for the WHO Commission on Social Determinants of Health

De Vogli and Birbeck (2005) affirm that there are five pathways from globalization to health, with a focus on women and children in Sub-Saharan Africa: (i) currency devaluations, (ii) privatization, (iii) financial and trade liberalization, (iv) health related charges and (v) education related charges. The two first pathways lead, respectively, to increase in the prices of food and shelter and would ultimately lead women to migrate to the cities where they become, along with their baby boys, more vulnerable to sexual abuse and HIV infection. The last two pathways, especially in poor countries, discourage access to health services and education and therefore increase their chances of being infected.

Lee et al., (2007) primarily focus on the effects of economic globalization and international governance on the social determinants of health. Lee et al. (2007) state that globalization has impacted global governance through four main channels; (i) the presence of global actors in the local scene has greatly challenged the effectiveness of national agencies in solving local problems, (ii) the transnational character of the problems that countries face, for example the endemic problem of HIV, has made it imperative to create interconnections between the different bodies, such as the ministeries-that previously tackled the problem in a disintegrated and isolated framework- therefore creating local interconnections that, later, branched out to other global bodies; (iii) the presence of global entities, such as UN, WHO, for example, has boosted the number of active actors in the market and society and has, therefore, challenged the distribution of power within the country, (iv) global governance has been witnessing a shift of power from some bodies like the WTO to others, like the World Bank and the OECD.

Lee et al., (2007) for their part state that global governance contributes a major role in addressing the social determinants of health as can be seen in figure III.1.5.

Figure III.1.5: Selected global institutions impacting on the social determinants of health



Source: Lee et al., 2007, Figure 1

III.1.2 Globalization and Health: Results

Collins (2003) asserts that one of the major impacts of globalization on health is related to the constraints imposed, particularly, by the Trade Related Aspects of Intellectual Property Rights (TRIPS) Agreement on the WTO member states, for the protection of the pharmaceutical patents. This limited access to patents of pharmaceuticals resulted in a consequent limited access to medicine (Collins, 2003).

In an assessment of the impact of globalization on access to health in Georgia, Collins (2003) finds that globalization has been very challenging as the effect of globalization have been coupled with the effects of the transition from one economic system to another. Private ownership of the health apparatus has resulted in a rise of health inequalities.

However, Collins (203) does recognize some positive merits to globalization. Globalization has in fact made it possible for developing countries and countries in transition to have access to the HIV/AIDS Care and Treatment Initiative. The United Nations Population Fund, United Nations Children's Education Fund, World Health Organization, World Bank and UNAIDS Secretariat and five companies teamed up to significantly subsidize the price of ARVs for a greater access in the developing countries. On the other hand, migration of health workers has also altered the ratio of health workers. All these factors are leading to a low health worker ratio. In Zimbabwe, "every 2,378 people needing ART, there is one doctor and 9 nurses". In Tanzania, for every 2,162 HIV positive people needing treatment, there is only one doctor and 18 nurses. Zambia has one doctor and 16 nurses for every 1,215 HIV positive people needing treatment." (Kachere, 2008).

In a similar vein, Cornia (2001) corroborates that TRIPS are a major contributing factor in the population health status. TRIPS make it more expensive for poorer countries to buy medicine and, therefore, limit their access to essential drugs. Cornia (2001) identifies another way the globalization of the economy affects health, in this case structural adjustment. The deregulation of the economy and particularly, structural adjustment programs have generated a decrease in taxes on trade flows has diminished the money entries of the less favored countries, especially, those in transition, therefore generating a sharp decrease in the expenditures on public services, specifically those related to health. In the example of fast liberalizing economies, such as the Russian Federation and China, expenditures as a percentage of GDP have seen a major drop, therefore directly affecting peoples' access to health. However, the author also points out to other examples where liberalization of the economy did not necessarily lead to less health resources, as in Latin America for example. A third and indirect way of establishing a link between globalization and health, following Cornia (2001) is via the increase in participation of women in the labor market. More labor supply, in general, means an additional income which might affect positively household health, especially that of children.

III.1.3 Globalization and Migration: The Circulation of Health Professionals

One feature of globalization is the increased circulation of goods and services between countries. Migration of individuals and families has seen acceleration the past decade, among which the migration of professionals. Health workers are particularly concerned with this migration. Poorer countries have become a major supplier of health workers for the richer countries (Shafqat & Zaidi, 2007).

The most frequent state is that medical graduate from US and other developed countries remain in those countries after graduation. Table III.1.1 shows that 25% of the international medical graduates from the US remain in the country, the percentage is of 28.3, 23.1 and 40 for countries like UK, Canada and Australia, respectively.

Table III.1.1: Characteristics of International Medical Graduates in Physician Workforces of the United States, the United Kingdom, Canada, and Australia.

Country	No. of Physicians per 100,000 Population	Total No. of IMGs	% of IMGs in Workforce	% of IMGs from Lower-Income Countries	% of IMGs from the Three Other Developed Countries
United States	293	208,733	25.0	60.2	6.5
United Kingdom	231	39,266	28.3	75.2	2.5
Canada	220	15,701	23.1	43.4	22.3
Australia	271	14,346	26.5	40.0	33.5

Source: Mullan (2005)

This phenomenon could find justification in the fact that some countries, which suffer a shortage in doctors and nurses try to retain recently trained graduates from poorer countries. Mullan (2005) estimates that between 23 and 28 percent of physicians in the United States, the United Kingdom, Canada, and Australia, and that supply between 40 and 75 percent of these international medical graduates. In Pakistan, in 2004 out of 1100 medical students' graduates from the Aga Khan University Medical College in Karachi, 900 have gone to seek more medical training in the US (Shafqat & Zaidi, 2007).

The exodus of young professionals is also exacerbated by systems that recognize international degrees (Segouin et al., 2005; Mullan, 2007).

The medical "brain drain" has been characterized by the pillage of poor countries from their medical human resources by the richer countries (Record & Mohiddin, 2006.) Health workers mass departure to better destinations has plagued Africa, Asia and Latin

America. In Africa, where there are problems of increased population and HIV infection and a number of other health problems has not been seen a sufficient supply of health professionals. The insufficient supply of medical doctors, nurses and others has been aggravated by a surge in the migration of these health professionals. This migration from the South to the north, mainly, takes place when the South itself suffers from health professional shortages (Table III.1.2.)

Table III.1.2: Estimates critical shortages of doctors, nurses and midwives.

WHO region	Number of countries		In countries with shortages		
	Total	With shortages	Total stock	Estimated shortage	Percentage increase required
Africa	46	36	590 198	817 992	139
Americas	35	5	93 603	37 886	40
South-East Asia	11	6	2 332 054	1 164 001	50
Europe	52	0	NA	NA	NA
Eastern Mediterranean	21	7	312 613	306 031	98
Western Pacific	27	3	27 260	32 560	119
World	192	57	3 355 728	2 358 470	70

Source: In Tan-Torres, 2008

The shortage in the Africa is estimated at 12%, 526% for the Americas, 9% for South East Asia, 23% for the East Mediterranean countries and 652% for the Western Pacific countries (World Health Report -WHO 2006 cited in OECD (2006.)

Calculations based on the tenet that 2.28‰ of health care workers are needed de for every 1,000 people, the World Health Report (2006)[86] utters that the world has incurred a shortage of 4 million health workers. The same report signaled 57 countries worldwide as having among which 36 sub-Saharan countries and that an estimated 2.4 million additional health workers are in short supply to meet the needs. The shortage is particularly acute in African and South East Asia (OECD, 2006).

It is estimated in Africa that around 23 000 qualified academic professionals emigrate annually (Pang et al., 2002), and that between 1985 and 1990, Africa has lost 60,000

[86] World Health Organization (2006), *Human Resources for Health in the WHO European Region*, WHO Regional Office for Europe.

professionals, with an average of 20,000 annually (Oyowe, 1996 and table III.1.3). The outflow of South African nurses is at least eight times the amount of the influx of nurses into the country (Bateman, 2007)[87].

Table III.1.3: Voluntary leavers: example of direct wastage in selected countries, 1999

Categories	Ghana		Lesotho		Namibia		Malawi	
	Total leavers	% voluntary	Total leavers	% voluntary	Total leavers	% voluntary	Total leavers	% voluntary
Nurses	744	58.7%	NA	NA	47	78%	43	23%
Doctors	315	84.4%	NA	NA	16	93.8%	18	83.3%
Others/All	-	-	50	62%	-	-	17	76.5%

Source: Dovlo D: Issues Affecting the Mobility and Retention of Health Workers/Professionals in Commonwealth African States. A consultancy report prepared for the Commonwealth Secretariat. London; 1999. In Dovlo, 2005.

Stilwell (2003) reports that the annual registrations in the UK of doctors originating from Ghana, South Africa and Zimbabwe represent 1.1 per cent, 2.0 per cent, and 0.7 per cent out the total number of registered doctors, respectively. In Ghana and "*According to the Ministry of Health, Ghana has about 13 physicians per 100,000 population (as compared with 256 in the United States) and about 92 nurses per 100,000 (as compared with 937 in the United States). Today, there are 532 Ghanaian doctors practicing in the United States. Although they represent a tiny fraction of the 800,000 U.S. physicians, their number is equivalent to 20% of Ghana's medical capacity, for there are only 2600 physicians in Ghana. An additional 259 Ghanaian physicians are in practice in the United Kingdom and Canada — and this group includes only those who have successfully been licensed after leaving Ghana."* (Mullan, 2007). This takes place when Ghana itself suffers from a grim shortage of health workers and when 7% of the physicians in the country are from Cuba (Mullan, 2007).

Robinson & Clark (2008) state that, between 1993 and 2002, 604 doctors and about a third of the country's nurses left the country. Bach (2006) shows that 43% of the

[87] A somewhat counter-trend study by Mukanga et al., 2010) has shown that 85 % of the graduate from field epidemiology training programmes in Tanzania and Nigeria do remain in their countries.

physicians from Liberia practice in the US or Canada. While Nigeria suffers from the lack of medical doctors, there are more than 21000 Nigerian doctors practicing in the United States alone.

Ihekweazu et al., (2005) find that approximately 40% of the graduates from medical schools during the years of 1995, 1996, and 1997 had migrated abroad about 10 years after graduation. Devlo (2005) adds that *"Significant increases in the migration of health professionals have occurred in recent years but monitoring of emigration flows is difficult, as few countries keep adequate statistics. Dovlo and Nyonator (1999)[88] estimated that between 1986 and 1995, 61% of doctors who qualified from one medical school in Ghana left the country. Of these, 6.2% had migrated to another African country (South Africa), but most went to the United Kingdom (55%) or the United States of America (35%). Huddart and Picazo (2003)[89] indicate that 840 out of 1200 doctors trained in Zimbabwe in the 1990s left the country and 17% of locally trained physicians and dentists left the Sudan in the 1980s and 1990s. In the case of Ghana, the physicians had left within 10 years of qualification, after working less than a third of the expected duration of their services."*

Oyowe (1996) cites that around 60% of all Ghanaian trained doctors in the 1980s did leave the country, and that 17% and 20% and 30% of, respectively, doctors, dentists and university lecturers in Sudan had left the country. In a report of the OECD (2006), it was estimated that African and Caribbean countries registered the biggest loss in terms of medical doctors and related professionals. The African countries most cited as the most concerned with this migration are the countries where conflicts or wars were taking place: Mozambique, Angola, Sierra Leone, United Republic of Tanzania and Liberia. Siringi (2001) reports that in 1996, out of 5000 doctors, only 4400 stayed home.

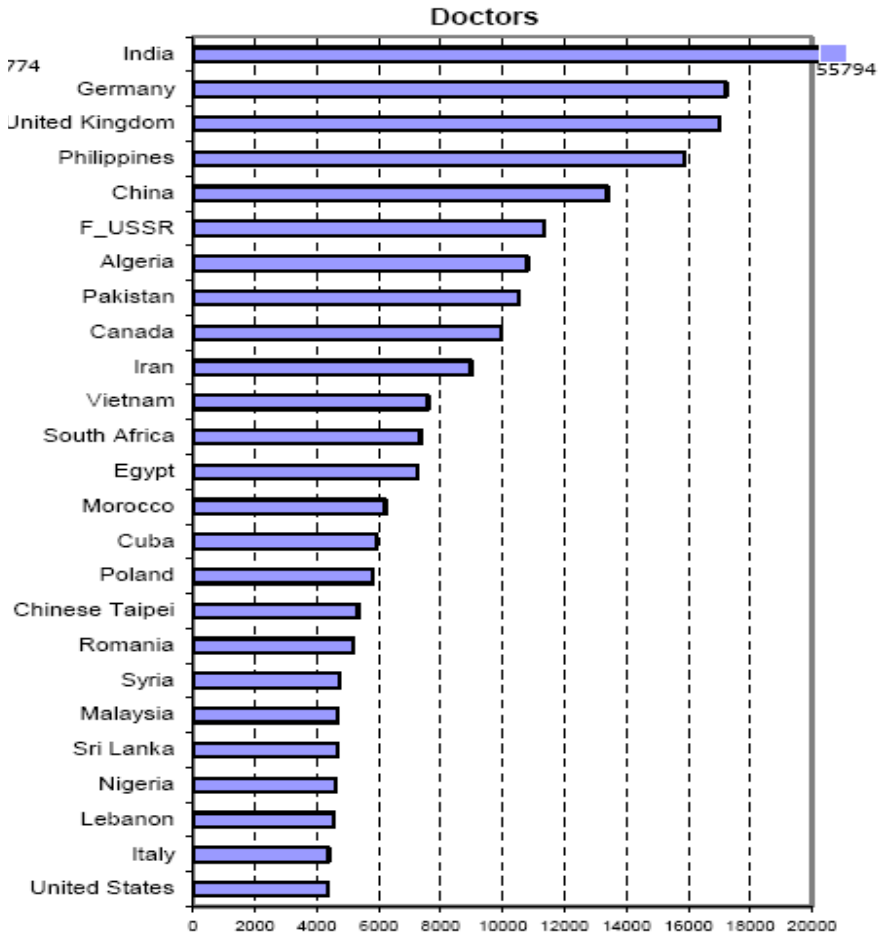
Migration seems to particularly plague countries such as Guinea Bissau, Sao Tome and Principe, Senegal, Cape Verde, Congo, Benin and Togo. As for the Caribbean, the countries where the migration of doctors has been the most felt are Cuba and Barbados,

[88] Dovlo D, Nyonator F: Migration of graduates of the University of Ghana Medical School: a preliminary rapid appraisal. *Human Resources for Health Development Journal* 1999, **3(1):**45.

[89] Huddart J, Picazo O: The health sector human resources crisis in Africa: an issues paper. Washington DC: USAID Bureau for Africa, Office of Sustainable Development; 2003.

Bahamas and to a lesser extent Trinidad and Tobago or Saint Vincent and the Grenadines (OECD, 2006).

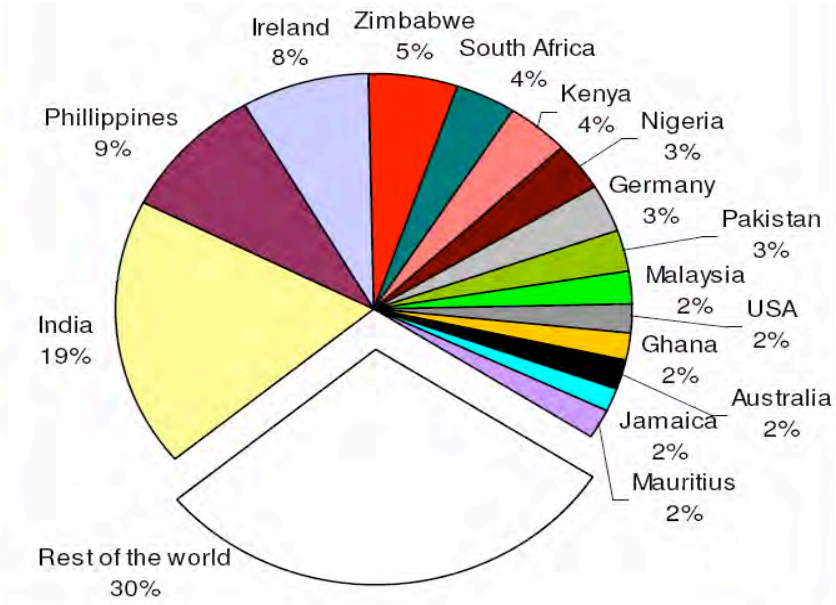
Figure III.1.6: The sources of migration into OECD countries



Source: Scherer, 2008

Asia is not in a situation of losing its medical doctors, as well as can be seen in figure III.1.7. Scherer (2008) also shows (figure III.1.6) that the bulk of the stock of nurses and doctors comes, respectively from countries like the Philippines and India. The Philippines is a major sending country, whereas it is facing a shortage of nurses of around 6% (Padilla, 2003).

Figure III.1.7: Migrant care workers by country of birth (%)

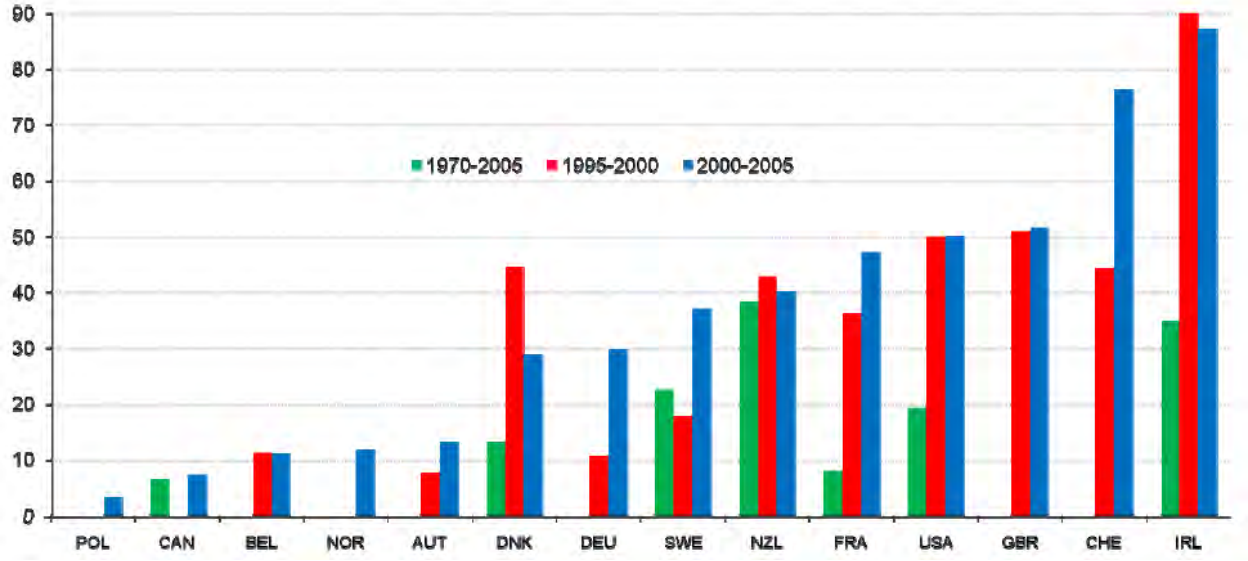


Source: Cangiano (2007)

In 1999, the destination country census shows that (i) 4,203 physicians in France are Sub-Saharan Africa born, (ii) 190 doctors then living in Canada were Egyptian born and that (iii) 75% of the medical trainees from Mozambique no longer live in the country Clemens (2007)[90]. For example, the UK has received a consequent portion of this migration from developing countries. Glover et al., (2001) estimate that 31% of the doctors practicing in the UK and 13% of its nurses are foreign born. The UK has a large part in the influx of health professionals; however, United States has the lion's share (Scherer, 2008.) OECD countries are increasingly reliant on foreign trained doctors (figures III.1.8 & 9).

[90] It is worthwhile noting that Clemens (2007) has noted some serious discrepancies in data reporting.

Figure III.1.8: Growing reliance in OECD countries on foreign trained doctors



Source: OECD Health Data 2007 and OECD International Migration Outlook 2007, In Scherer, 2008

Figure III.1.9: Share of foreign trained or foreign doctors in selected OECD countries in 2008

1. 2005.
2. 2006.
3. 2007.
4. 2004.

Source: www.oecd.org/health/workforce, cited in OECD (2010.)

On the receiving end, the report of OECD (2006) states that United States host 47% of those migrating doctors to OECD countries in 2000. Whereas the OECD-EU25 region and Australia and Canada have in turn secured about 39% and 5% of the flows,

respectively. An interesting particularity is that most of those migrating doctors to the States originate from Asia and Latin America, as shown in table III.1.4. Most North African doctors seem to prefer France.

Table III.1.4: Foreign (trained) Physicians in eight EEA⅄-countries and their geopolitical region of origin

		DESTINATION COUNTRY*			
		UK, 2005	**IRE, 2007**	**GERM, 2005**	**ITA, 2004**
ACTIVE/REGISTERED PHYSICIANS *Total (ratio per 100,000 inhabitants)*		**239,274 (398.4)**	**15,512 (356.3)†**	**307,577 (372.8)**	**365,652 (631.7)**
FOREIGN PHYSICIANS †		**74,031**	**4,663**	**18,582**	**12,525**
SOURCE COUNTRY/REGION*					
EU		**20,863**	**1,224**	**8,611**	**3,829**
EU 15,		***17,085***	***893***	***5,394***	
	mainly from	*IRE (5,959) GERM (4,026)*	*UK (592) GER (103)*	*GRE (1,357) AUS (1,269)*	*GERM (1,034) FRA (649) GRE (649)*
EU+12,		***3,778***	***331***	***3,217***	
	mainly from	*POL (1,424) HUN (647)*	*POL (155) HUN (59)*	*POL (1,171) ROM (692)*	*ROM (389) POL (207)*
OTHER IN EUROPE		**982**		**3,509**	**1,351**
Non-EU FMC ‡,		**222**	**9**		
	mainly from	*SWZ (123)*	*SWZ (7)*	*SWZ (153)*	*SWZ (760)*
Rest of Europe		***760***			
	mainly from	*RUS (342) UKR (145)*		*RUS (1,572) UKR (730)*	*SERB (437) ALB (204)*
NORTH AMERICA (US & CAN.)		**344**	**2**	**235**	**771**
CENTRAL & SOUTH AMERICA		**270**		**420**	**1,753**
OCEANIA		**3,290**	**378**	**15**	**107**
AFRICA		**12,630**	**840**	**813**	**1,590**
ASIA		**34,816**		**4,723**	**2,328**
NO SPECIFIED		**836**	**2,210**	**256**	**107**

		DESTINATION COUNTRY*			
		AUS, 2005	**PORT, 2005**	**FRA, 2005**	**NW, 2006**
ACTIVE/REGISTERED PHYSICIANS *Total (ratio per 100,000 inhabitants)*		**28,496 (347.2)**	**32,552 (309.2)**	**212,972 (340.7)**	**18,280 (393.9)**
FOREIGN PHYSICIANS:		**1,442**	**3,199**	**7,665**	**2,799**
SOURCE COUNTRY/REGION*					
EU		**1,396**	**2,134**	**4,149**	**2,070**
EU 15,		***1,317***	***2,123***	***3,811***	***1,882***
	mainly from	*GERM (1,003) IT (220)*	*SP (1,874) GERM (104)*	*BELG (1,368) GERM (879)*	*GERM (673) SWE (530)*
EU+12,		***79***	***11***	***338***	***188***
	mainly from	*HUN (29) CZE (23)*	*POL (5) CZE (3)*	*ROM (158) POL (95)*	*POL (64) LITH (37)*
OTHER IN EUROPE		**25**	**120**	**103**	**340**
Non-EU FMC ‡,				***53***	***107***
	mainly from			*SWZ (46)*	*ICE (95)*
Rest of Europe				***50***	***233***
	mainly from			*RUS (15)*	*SERB (73) RUS (71)*
NORTH AMERICA (US & CAN)		**2**		**20**	**45**
CENTRAL & SOUTH AMERICA			**503**	**101**	
OCEANIA			**2**		**0**
AFRICA			**425**	**2,765**	**23**
ASIA		**19**	**10**	**519**	**234**
NO SPECIFIED		**0**	**0**	**8**	**87**

* Codes: AUS, Austria; BELA, Belarus; BELG, Belgium; CAN, Canada; CYP, Cyprus; CZE, Czech Republic; EU, European Union; EU 15, EU members before 2004; EU+12, EU new countries after 2004; FRA, France; GERM, Germany; GRE, Greece; HUN, Hungary; ICE, Iceland; I RE, Ireland; IT, Italy; LITH, Lithuania; NW, Norway; POL, Poland; PORT, Portugal; ROM, Romania; RUS, Russia (registered doctors from ex-USSR included); SERB, Serbia and Montenegro (registered doctors from ex-Yugoslavia included); SLK, Slovakia; SP, Spain; SWE, Sweden; SWZ, Switzerland; UK, United Kingdom; UKR, Ukraine.

† Foreign/foreign trained physicians (see text).

‡ "Free movement countries": non-EU countries with a contract on free movement of persons with EU: Iceland, Norway, Switzerland and Liechtenstein.

⅄ EEA: European Union plus some of the non-EU member states in the European Free Trade Association: Norway, Liechtenstein, Switzerland and Iceland). Source: García-Pérez et al., (2007, table1).

The movement of health workers to the UK, and Europe in general, is to be explained by the need in terms of health care that the country witnesses. Martineau and Decker (2002)[91] quote estimates showing that England alone will need 25,000 more doctors by 2008 than it did in 1997, making changes in health professional demand unlikely in the short to medium term. A second reason for the flood into the UK could also be found in the kind of policies on the migration of health workers that Anglo-Saxon and Western countries, in general, have adopted. Simplified procedures have been set up to ease the recruitment of health workers.

In the United Kingdom, Belgium, Ireland, Denmark, the Netherlands and Spain, for example, health care are part of shortage lists, which entitles these countries to waive the regular labor market test is waived. Australia and New Zealand have a special point system which favors health workers migrants. In the US, in 2005, about 7200 requests for H1-B visas were granted for health professionals, which represent an increase by 55% compared to the previous year (OECD, 2008).

Amongst European countries, the UK receives the largest share of foreign physicians followed by Italy and Germany (Table 4); while Ireland is the European country with the largest number of doctors practicing abroad, approximately 47.5% (García-Pérez et al., 2007). For example, in the UK, most of the migrant are from India, Philippines, Ireland and Zimbabwe (table III.1.5).

[91] Martineau T, Decker K. Briefing Note on International Migration of Health Professionals: Leveling the Playing Field for Developing Country Health Systems. Liverpool: Liverpool School of Tropical Medicine; 2002. [November 9, 2006]. Cited in Dovlo (2004.)

Table III.1.5: Supply of foreign (-trained) physicians in selected OECD member countries

Australia (1998): 21.4% of foreign-trained physicians, of those:		Austria (2001): 3.3% of foreign physicians, of those:	
United Kingdom	39.0%	Germany	84.3%
Asia	28.0%	Italy	7.3%
New Zealand	12%		
Other countries	21%		

Belgium (2001): 7.8% of foreign physicians, of those:		Canada (1998): 20% of foreign-trained physicians, of those:	
Netherlands	28.0%	United Kingdom	32%
Italy	17.7%	South Africa	9.7%
United Kingdom	16.5%	India	9.6%
France	16.4%	Eastern Europe	8.5%
Slovak Republic	12.4%	Western Europe	8.2%
Africa	9.0%		

Denmark (2001): 7.8% of foreign physicians, of those:		France (2000): 2.2% of foreign physicians, of those:	
Norway	50.0%	Europe	49.0%
Spain	24.7%	North-Africa	33.0%
Germany	20.1%	Sub-Saharan Africa	7.0%
United States	5.2%	Middle East	5.0%

Germany (2000): 3.5% of foreign physicians, of those:		Ireland (2001): 13.1% of foreign physicians, of those:			
EU countries	27.5%	United Kingdom	29.2%	France	3.2%
Other European countries	37%	EU countries	13.6%	Italy	3.2%
Non-European countries	35.5%	Germany	6.0%	Canada	3.1%
		Australia	4.2%	Central and Eastern Europe	3.1%
		United States	3.4%	Others	31.2%

Norway (2001): 11.2% of foreign physicians, of those:				Switzerland (2001): 19.1% of foreign physicians, of those:			
Germany	32.7%	United Kingdom	6.2%	Germany	59.7%	Italy	4.8%
Sweden	19.9%	Iceland	6.1%	Yugoslavia	13.1%	Albania	4.0%
Denmark	15.8%	Finland	5.3%	Belgium	7.4%	Spain	3.2%
Central and Eastern Europe	11.5%	Netherlands	2.4%	Sweden	4.9%	Argentina	2.9%

United Kingdom (2001): 12.6% of foreign physicians, of those:				United States (2001): 27% of foreign-trained physicians, of those:	
India	18.3%	South America	2.4%	India	19.5%
Ireland	15.2%	Ukraine	1.7%	Pakistan	11.9%
South Africa	7.0%	Poland	1.6%	Philippines	8.8%
Other Africa	7.0%	Australia	1.6%	Ex-U.S.S.R.	3.1%
South and South-Eastern Asia	7.0%	Belgium	1.6%	Egypt	2.6%
Northern Africa	5.3%	China	1.6%	Dominican Republic	2.5%
Greece	4.7%	Denmark	1.5%	Syria	2.5%
Pakistan	4.4%	France	1.5%	United Kingdom	2.4%
Germany	4.0%	Western Asia	1.5%	Germany	2.3%
Algeria	3.6%	Italy	1.4%	Mexico	1.8%
Iraq	3.1%	Bosnia Herzegovina	1.4%		
Spain	2.6%				

Source: Bourassa Forcier et al., (2004) citing EUROSTAT Labour Force Survey.

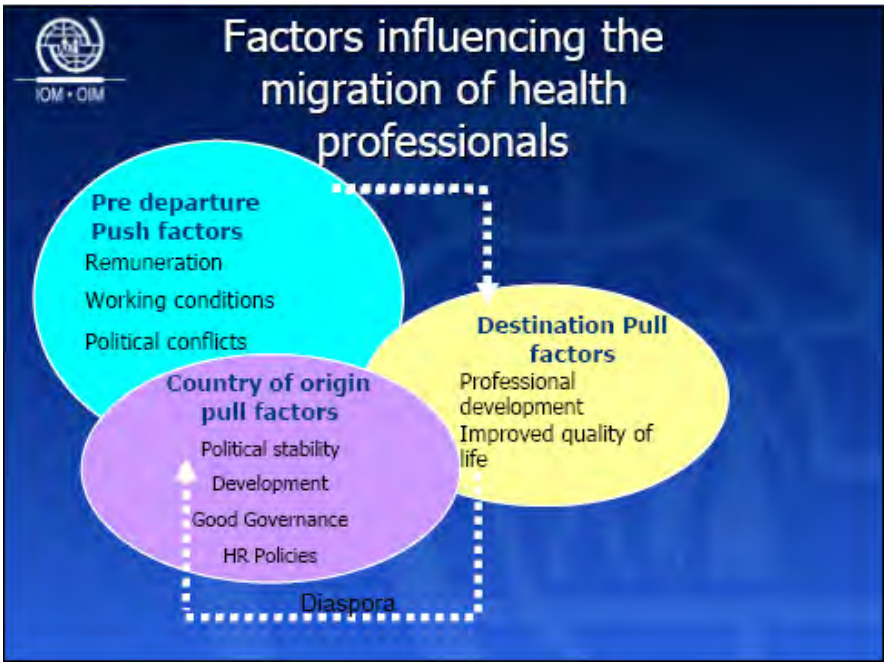
In 2000, in the OECD countries, 18.2% of the practicing doctors were born elsewhere. The average percentage foreign born doctors residing in OECD countries for the year 2000 was around 18.2%. This percentage ranges from 46.9 in New Zealand and 42.9 in Australia, to approximately 35 in Canada and Ireland, to 33.7 in the UK and 30.2 in Luxembourg (OECD, 2006).

III.1.4 Motives for the increase in the circulation of Health workers

Motives for increased migration of health-care workers range from local and local to international motives. In other words, the motives range from pull to push factors. The first category has to do with conditions in the destination country that has to do with for example, professional training and career development, poor healthcare infrastructure, lower wages, among others. Push factors have to do with the relatively better conditions in the destination countries, such as higher salaries, and much better opportunities for career training and development (Sagoe, 2004.)

Davies (2006) finds that the migration of health professionals is majorly driven by: (i) the rapidly aging population in developed countries generating more health demand, (ii) the unfavorable working and living conditions in the countries of origin (figure III.1.10).

Figure III.1.10: Factors influencing the migration of Health professional



Source: Davies, 2006

A research by Vujicic et al. (*2004*) shows that wage differentials are a considerable factor in promoting migration of health workers (table III.1.6). However, other factors are also to consider in assessing reasons for migration of health-care takers. Although the salaries of Ghanaian doctors are better than those in many African countries, doctors are quick to point out that their pay is still modest.

Table III.1.6: Health care wages in source and destination countries, most recent data available

	USDPPP monthly wage			
	Nurse		Doctor	
Source countries				
Chad	$	425	$	1,050
Cote d'Ivoire	$	530	$	774
Ghana	$	206	$	473
Lesotho			$	3,379
Malawi	$	489	$	868
Mozambique	$	441	$	2,826
Namibia			$	2,503
Phillipines	$	380		
Sierra Leone	$	175	$	228
South Africa	$	1,486	$	2,836
Sri Lanka	$	407	$	1,329
Trinidad Tobaggo	$	913	$	1,514
Uganda	$	38	$	67
Zambia	$	106	$	425
Destination countries				
USA	$	3,056	$	10,554
U.K.	$	2,576	$	7,676
France	$	2,133	$	5,120
Canada	$	2,812	$	8,472
Australia	$	2,832	$	5,438

Source: Vujicic et al. (2004) citing World Health Organization: **Migration of health** professionals in six countries: a synthesis report. *Brazzaville: World Health Organization Regional Office for Africa* 2003.

In study of an urban and a rural district of Burkina Faso in 2007, Bocou surveys the perceptions of the health force and finds that the salaries and bonuses are below expectations compared to the load that this health work force endure. Bocou (2007) also states that one of the reasons why medical doctors migrate, in this case, to international organizations is financial incentives along with an aim for career development.

Table III.1.7 states findings from a survey undertaken by the WHO in six African countries to appraise whether they would like to migrate and what are the factors that might push them to do so. The health professionals' surveys are those still living in their countries of origin and those who had already left. The report shows that wages are an important factor. Among other factors, we find that Fringe benefits, and an improvement f the working conditions could be a good incentive to retain health professionals in their countries.

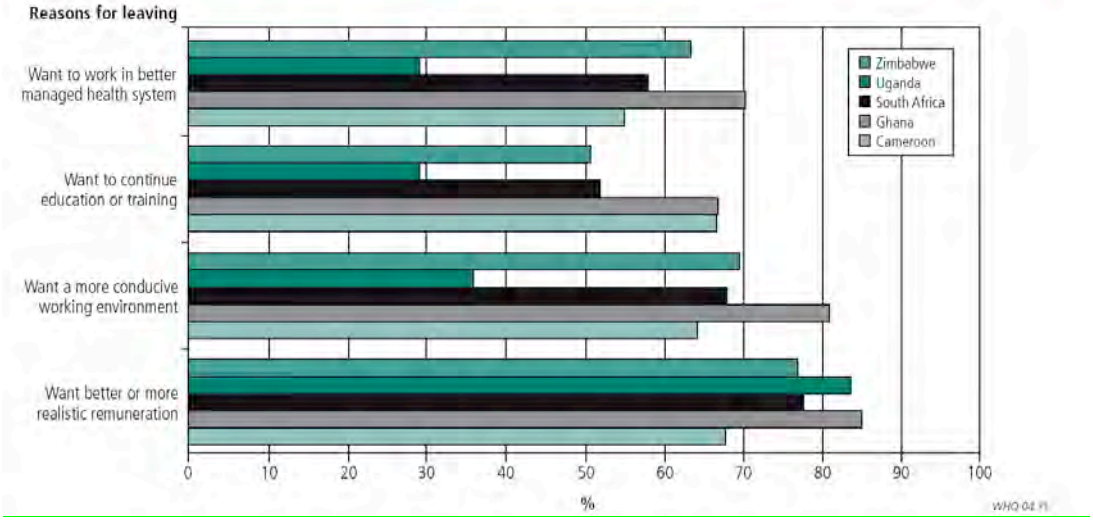
Table III.1.7: Factors influencing health care professionals' intent to migrate, reason for migrating and willingness to remain in their home country

	For what reasons do you intend to leave your home country?	For what reasons did you leave your home country?	What would make you remain in your home country?
Cameroon	Upgrade qualifications (85%)	Recruited (29%)	Salary (68%)
	Gain experience (80%)	Gain experience (28%)	Continuing education (67%)
	Lack of promotion (80%)	Better pay (27%)	Working environment (64%)
	Living conditions (80%)	Living conditions (19%)	Health care system management (55%)
Ghana		Gain experience (86%)	Salary (81%)
		Lack of promotion (86%)	Work environment (64%)
		Despondency (86%)	Fringe benefits (77%)
		Living conditions, Economic decline (71%)	Resources in health sector (70%)
Senegal	Salary (89%)		Work environment (n/a)
	N/a		Salary (n/a)
	N/a		Better career path (n/a)
	N/a		Benefits (n/a)
South Africa	Gain experience (43%)		Salary (78%)
	Violence and crime (38%)		Work environment (68%)
	Heavy workload (41%)		Fringe benefits (66%)
	Declining health service (38%)		Workload (59%)
Uganda	Salary (72%)	Salary (55%)	Salary (84%)
	Living conditions (41%)	Economic decline (55%)	Fringe benefits (54%)
	Upgrade qualifications (38%)	Save money (54%)	Work environment (36%)
	Gain experience (24%)	Declining health service (53%)	Workload (30%)
Zimbabwe	All factors	All factors	All factors

Source: Vujicic et al. (2004)

Stilwell et al., (2004) and survey immigration applicants in the health sector for their reasons to immigrate and find that, aside from the recurrent themes such as wages, for example, working in a better environment, aspiration to a better career are some of the driving factors behind the decisions to migrate (Bundred and Levitt, 2000) (fig. III.1.11).

Figure II.1.11: Factors affecting health professionals' decision to migrate from African countries



Source: Stilwell et al., 2004

Kyobe (2010) adds that among the reasons that are usually cited to justify immigration is the pressure of working on crowded wards with few drugs and little essential equipment and the feeling of being undervalued. In addition to these factors, Pang et al., (2002) adds an oppressive political climate, persecution of intellectuals, and discrimination. Similarly, researchers have issues in their home countries with (i) the lack of funding, (ii) poor facilities, (iii) limited career structures, and (iv) poor intellectual stimulation. The dissatisfaction factors also include, as indicated in table 8 are security, the threat of violence from ethnic frictions (Stiwell, 2003[92]), and the wish to provide a good education for their children Buchan and Perfilieva (2006).

[92] Citing Dovlo, D. (1999), 'Issues Affecting the Mobility and Retention of Health Workers/Professionals in Commonwealth African States', London: Consultancy Report for the Commonwealth Secretariat, unpublished manuscript.

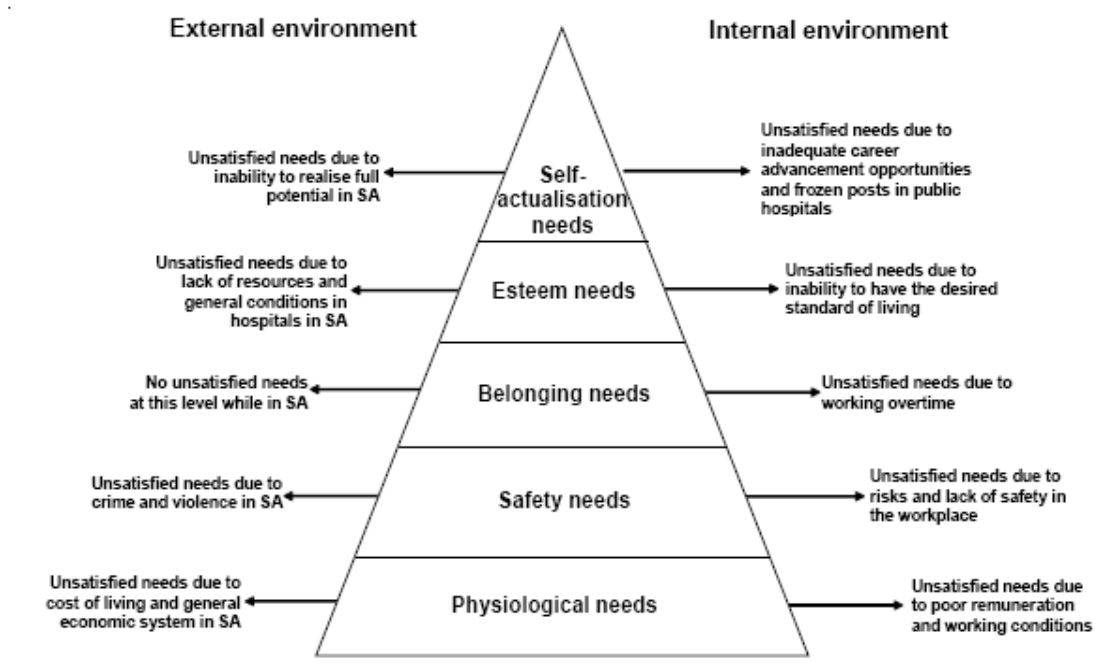
Table III.1.8: Main push and pull factors in migration and international recruitment of health workers

Push factors	Pull factors
Low pay (absolute and/or relative)	Higher pay
Poor working conditions	Opportunities for remittances
Lack of resources	Better working conditions
Limited career opportunities	Career opportunities
Limited educational opportunities	Better resourced health systems
	Provision of post-basic education
Impact of HIV/AIDS	Political stability
Unstable/dangerous work environment	Travel opportunities
Economic instability	Aid work

Source: Buchan and Perfilieva 2006 (Adapted from Buchan, Parkin, Sochalski, 2003)

Oosthuizen and Ehlers, 2007 claim that the factors that influence migration of nurses South African, for example, are internal, external and are needs based (figure III.1.12). Factors such as those political and economic of the country, and those factors related to the nursing and health care sector, as well as those related to the nurses' physiological, social and esteem needs and physiological and safety needs are all important determinants in the decision to migrate essentially to Australia, New Zealand, the United Arab Emirates, Saudi Arabia, Ireland, the Netherlands, the UK and the USA.

Figure III.1.12: Factors contributing to the emigration of South African nurses



Source: Oosthuizen and Ehlers, 2007 (fig. 1)

Asides from the pull factors, push factors play a considerable role into favoring the migration of health care takes to better skies. Stilwell et al., (2004) and Robinson et al. (2008), and Berliner and Ginzberg (2003), for example, state that the shortage of supply of health professionals in destination countries is the major reason for the high immigration of health workers. Aside from higher wages and better working conditions, the assurance that a health professional will find a job in the destination country is a major incentive to migrate. Most of the destination countries, as shown in table III.1.9, are USA, UK and Western Europe.

Table III.1.9: Ranking of destinations among health care professionals from Africa who intend to migrate

	Most frequent destination	Second most frequent destination	Third most frequent destination	Fourth most frequent destination
Cameroon	USA	France	United Kingdom	Canada
Ghana	United Kingdom	USA		
Senegal	USA	France	Canada	Belgium
South Africa	United Kingdom	Australia	USA	Canada
Uganda	United Kingdom	USA	Africa	
Zimbabwe	United Kingdom	South Africa	Botswana	Australia

Source: Vujicic et al. (2004)

In assessing the pull factors, Shafqat and Zaidi, (2007) states that the United States are an important destination country for the following reasons: (i) a rigorous system of graduate medical education, (ii) a merit-based structure of professional rewards, (iii) a culture of academic nurturing, and (iv) relatively good salaries. "*In Pakistan, an intern earns approximately $150 per month (the same salary as an unskilled, illiterate worker), whereas a U.S. intern can afford to live independently — and expect a better quality of life after residency*" Shafqat & Zaidi (2007.)

Stilwell et al., (2004) identify two factors that have contributed positively to the increase in health workers migration: (i) new communication technologies which have helped create a hub for a new global market where demand and supply of health workers takes a global level, (ii) bilateral and multilateral regulatory framework for health profession has facilitated the movement of health professionals from one country to another.

In addition to the development of bilateral and multilateral regulatory framework, the development of international standards for the health profession, especially in the domain of quality of care and in medical education (as detailed in table III.1.10) has also been a major contributing factor in easing health workers movement (Segouin et al., 2005).

Table III.1.10: International Quality Standards and Globalization

	Services offered by different countries	Services bought by individuals	Quality/accreditation
Hospital care	Care offered at lower price in a wide range of countries: elective surgery, aesthetic surgery, fertility treatment, and so on	Europeans people (especially French) in Tunisia for aesthetic surgery, US people in Europe or South Africa for infertility treatment, and so on	Development of international standards of accreditation of health care organization: Joint Commission International, Alpha program (Isqua), and so on
Medical education	Courses in English for pregraduate training	Medical school places offered in Poland, Czech Republic to citizens of other western countries, and so on	International standards: World Federation for Medical Education, International Institute for Medical Education, Conférence Internationale des Doyens de Médecins d' Expression Française, and so on

Source: Segouin et al., (2005, Table 1)

To level up the qualifications of the foreign doctors to that of the local health care workforce, most of the OECD countries have set up a system to recognize foreign qualifications. In United States, all foreign trained doctors have to re-do their internship. In the United Kingdom, foreign-trained doctors need to take a test and if they pass have to wait for about a year before being fully registered. In Canada, those foreign-trained doctors have to go medical training at a Canadian university for a length of time between two to six years. In France, although in theory, foreign nationals need to receive an equivalency, many of those doctors, in reality, practice in French public hospitals. Moreover, an important effort has been concerted to regularize the situation of those doctors a new structure has been set up to recognize foreign qualifications.

In addition to foreign born doctors have also to take a language test, which could explain the outpouring of foreigners into countries with which they share history, administrative and legislative framework as well as the language. Path dependency seems to be an important determinant to choose the destination country. This explicates the outpouring of migration from India and Pakistan to Australia, Canada, UK and US, whereas physicians from North Africa migrate toward France (Bourassa et al., (2004). A country like Portugal, for example, seems to particularly attract, those health workers migrants from Portuguese speaking countries as seen in table III.1.11.

Table III.1.11: Physicians migrating from Portuguese speaking countries to Portugal

Source Country	Number of Physicians	
	in Portugal	in Source Country
Angola	820	961
Guinea-Bissau	358	197
Sao Tome and Principe	238	67
Cape Verde	231	71

Source: Stilwell et al., 2004

Berliner and Ginzberg (2003) and Marchal & Kegels, (2003) also mention as pull features factors that favor that have increased the need for medical doctors supply, among others the advances in the medical field and medical technology and the appearance of new diseases. This surge in the demand for doctors, and for health workforce, in general, has not been met with an increase on the supply side. In most OECD countries, the number of students applying for medical college has witneses a noticeable decrease. For example, in Charlatan (2000) finds that the number of applications in medical schools in the States has dropped from 46,968 students in 1996 to 37,137 in the year 2000.

One other major pull factor is the legal framework set up by developed countries to ease up mobility constraints on health care workers. Australia and New Zealand, for their part, have set a point system for immigration that positively favors health professionals. In United States, for example, students with a J-1 visa can see their 2-yest residency back home waived if they agree to serve for at least 3 years in an under-served area. The UK has extensively exploited bilateral agreements and memoranda with non-OECD countries to recruit doctors and nurses. It has for example, signed agreements with India, South Africa, and China.

It is finally worth mentioning that a recent study by the WHO (2011) focusing on "*Governance for health in the 21st century: a study conducted for the WHO Regional Office for Europe*" is focusing on the main pillars that need to be considered in governing health. In this study, '*governance for health*' is "*defined as the attempts of governments or other actors to steer communities, countries or groups of countries in the pursuit of*

health as integral to wellbeing through both a 'whole-of-government' and a 'whole-of-society' approach". Health is identical to well being in 21st century with a focus on human rights and equity. It consequently accounts for all sectors and all potential partners at local, national and international levels. The mobilization of on-going and new knowledge from research places a new burden and requirement on health agencies.

All these new features expressed in this new study show that health globalization is helpful in ensuring higher health outcomes at the condition of including all local, national and international in the process of health production and diffusion.

Conclusion

The circulation of medical doctors and of medical labor force is a vital process, which fosters the competitiveness of countries as well as a world's knowledge-based economy. Globalization of the economies besides the efforts to promote a more globalized health system are inducing more incentives both and national and international levels to develop and implement more cooperation in health. Under these circumastances, medical education and research can be an important source for expanding also migration from South to North. The elements that relate to the new win-win framework are discussed in the following chapter.

The circulation of medical doctors and of medical labor force is a vital process, which fosters the competitiveness of countries as well as a world's knowledge-based economy. Globalization of the economies besides the efforts to promote a more globalized health system are inducing more incentives both and national and international levels to develop and implement more cooperation in health. Under these circumastances, medical education and research can be an important source for expanding also migration from South to North. The elements that relate to the new win-win framework are discussed in the following chapter.

III.2 Migration of Medical Doctors: A Cooperative Framework

This sub-part is devoted to showing that further and mutual cooperation is among the possibilities that can transform brain-drain into mutual brain-gain for players that are in the North and South. A game theoretical framework is introduced in relation to migration patterns related to medical doctors.

This sub-part deals with the issue of coordinating migration of medical doctors amongst coalitions, with eventual application to the context of the Mediteranean areas with the Euroepan Union and MENA countries. It investigates the mainly the directions of incentives of agents and countries to share a common framework that mutually value skilled health labor force. It examines what kind of incentives can be suggested based on the positive outcomes from migration to both parties from medical doctors. The definition of "acceptability" is twofold. First, the river sharing agreement (or allocation) should be stable in the sense that no users or group of users are better off designing another river sharing agreement. Furthermore, it should be perceived as fair according to certain justice principles. This issue is tackled using cooperative game theory. The paper describes the cooperative game induced by a river sharing problem, and analyzes the stable river sharing agreements in this cooperative game. Next, it considers standard axiomatic principles of fair division and adapts them to the migration of medical doctors. It conceives fair sharing rules for both the welfare of the sending as well as of the receiving country.

This latter issue is addressed using a cooperative framework with "utility transfer" and "side payments" to formalize the relationship between a sending and a receiving country. The intuition behind this approach is that a coalition can be formed based on an agreement between for example, Morocco and one country from the European Union, or between Morocco and the European Union. This agreement would set the terms of trade between the two countries in defining the checks and balances for a free circulation of medical doctors.

III.2.1 Need for A cooperative Framework

As stated before, in 2006, the World Health Organization estimated 36 sub-Saharan African countries suffer a serious shortage in health care professionals (OECD, 2010). To this shortage in workforce is added the loss in terms of return to investment in the skilled labor that migrates abroad. The cost implications of the migration of health professionals are multiple and important. Bourassa Forcier et al., (2004) listed the implications on the host countries as the following: (i) a depletion of human resources, (ii) a rise in the level of poverty and inequality which will negatively impact economic growth in those countries. Record & Mohiddin (2006) add to this list: (i) loss of intellectual capital, (ii) poorer health service delivery in the host countries and (iii) a loss in public educational investment.

The loss in return to investment in education of the origin countries is tremendous. Muula and Panulo (2007) have estimated the loss that a country like Malawi incurs when losing a medical doctor to immigration. The loss has been estimated to a total of US$ 56,946.79 in solely fees and costs of education including that of primary education. They also estimate the loss between US$ 433,493 to US$46 million at interest rates 7% and 25%, respectively. Between 1986 and 1995, Dolvo, (2004) reports that in one medical school in Ghana, 61% of medical graduates have migrated leading to an estimated US$5,960,000 in tuition costs.

Misau et al., (2010) undertook a study on the economic loss from a doctor in Kenya which amounts to approximately US$ 48,169. He adds that "*The total cost of secondary education per student is US$ 6865 and that for primary education US$ 10,963. Thus, the total education cost per medical doctor is US$ 65,997. This figure does not represent the loss incurred by society because of emigration of a single medical doctor. The real loss is the cumulative dollar value of the investment made by the Kenyan society in producing a doctor who decides to emigrate for a period of 't' years. With the assumption that: the average age of emigrating doctors is 30 years; the average statutory pensionable age for Europe and Americas is 62 years, an emigrant doctor would work for 32 years before retirement; and the feasible average interest rate on fixed deposits in Kenya is 6.65%, if the amount of US$ 65,997 (i.e. cost of educating one medical doctor) were put into a*

commercial bank for a period of 32 years at a fixed deposit interest rate of 6.65% per annum, the investment will grow to US$ 517,931. This is obtained by applying the standard compounding formula: [(initial investment) × $(1+r)^t$] = [US$ 65,997 × $(1+0.0665)^{32}$]. Therefore, on average, for every doctor that emigrates, a country loses about US$ 517,931. The economic loss incurred by Kenya as a result of the brain drain of 167 medical doctors is US$ 86,494,477, i.e. 167 doctors × US$ 517,931 per doctor." (cited in Kirigia & al., 2006)

Pakistan, which suffers from a medical staff shortage, has provided the US with around 10,000 of its medical graduates (Shafqat & Zaidi, 2007). Likewise, India and since 1951 has lost around 83,000 doctors to the States, which amounts to around US$3.6 - 5.0 billion lost in investment (Nayak[94], 1996).

On the receiving end of migration, the United Nations Commission for Trade and Development has estimated that each migrating African professional represents a loss of $184 000 to Africa (Oyowe, 1996)…" *The US Congressional Research Service, for example, computed in 1971-72 that the USA gained $20 000 annually on each skilled migrant from the developing countries. If this rather conservative amount is extrapolated for Africa, then the continent lost more than $1.2 billion of investment between 1985 and 1990 on the 60 000 or so African professionals who emigrated during that period. Much closer perhaps to the truth today would be the estimate made by the United Nations Conference on Trade and Development (UNCTAD), using 1979 prices, which put a cash value of $184 000 on each African professional migrant (and this only for those between the ages of 25 and 35)* (Oyowe, 1996.)

However, immigration negatives can be reduced with the right policies. In a study of the cost and benefits of the immigration of health workers on the economy of Malawi, a group of researchers from Kings College London in the UK and from the Malawian Ministry of Industry and Trade has suggested the following three points as a means to turn the cost into benefits: (i) receiving countries could refund a part of what they receive from the foreign doctors in form of taxes to the sending countries, (ii) the Malawian country can charge for medical education in Malawi which could be overwritten if the

graduate spends of certain number of years in his/her native country, (iii) the Malawian government can also facilitate international payments, thereore facilitating remittances from its immigrant doctors (Record & Mohiddin, 2008).

Bundret and levit (2000) proposes an ethical framework that would set the tone for agreements between developing and developed countries, whereby immigration would be allowed for a limited period of time. At the end of their time as immigrant, returning health workers would have acquired enough experience and know how to improve of their native countries' health system and delivery (ILO, 2005). Such bilateral agreements have already taken place, and example of which the agreement that took place between UK and Ghana. In this framework, UK has agreed to specify the limits of residence of foreign trained nurses after which they were supposed to return home[93]. UK has also another bilateral agreement with South Africa in 2003 called Memorandum of Understanding (MOU). Robinson and Clark (2008) reports, although with reserves, that following MOU the number of registered nurses as a proportion of non-EU registrations, has fallen from 24.6% to 4.4%.

The UK has also signed a memorandum of understanding with India in 2002 and a Protocol on Cooperation in Recruiting Health care Professionals with China in 2005 (OECD, 2008). Aside from the bilateral agreements, regional agreements have already been taking place. An example of a regional agreement is the Caribbean Community (CARICOM) which has put in place a framework to encourage highly skilled medical professionals to leave for abroad and coma back on a rotational basis, hoping therefore to limit "brain drain."(Stilwell, 2004).

Health worker retention has been proposed as one major solution to control immigration. Mukanga (2010), for the case of Zimbabwe for example, and Kyobe (2010) have prescribed the following (i) increase the investment in the infrastructure and resources of the heath sector, (ii) develop a career path for health workforce in their country of origin, (iii) field-based training and (iv) create innovative incentives. In other words, important efforts have to be put forth by Africa and other countries of immigration to either entice them into staying or lure them back and integrate them into their native health systems.

[93] However, the agreement is still pending because no formal setting for the repatriation of nurses was signed.

Davies (2006), for example, advises to channel remittances to financing national health care and attract the Diaspora to contributing to the development and strengthening of national health system. An example of such an initiative is Migration for Development in Africa" (MIDA). MIDA is a capacity-building program set up by the International Organization for Migration in collaboration with the African Development Bank which has as objective "*to mobilize competencies acquired by African nationals abroad for the benefit of Africa's development*.[94]" MIDA aims at helping African Diaspora to transfer their knowledge and skills to their peers in African countries.

On the education level, medical education should be reformed to include improvements. A commission made out of twenty professionals and academic leaders from different parts of the world, recommended the following reforms to improve on professional health education to have two major outcomes: (i) transformative learning and interdependence in education. To reach these outcomes, the reforms should "a*dopt competency-driven approaches to instructional design; adapt these competencies to rapidly changing local conditions drawing on global resources; promote interprofessional and transprofessional education that breaks down professional silos while enhancing collaborative and non-hierarchical relationships in effective teams; exploit the power of information technology for learning; strengthen educational resources, with special emphasis on faculty development; and promote a new professionalism that uses competencies as objective criteria for classification of health professionals and that develops a common set of values around social accountability. Institutional reforms should: establish in every country joint education and health planning mechanisms that take into account crucial dimensions, such as social origin, age distribution, and gender composition, of the health workforce; expand academic centres to academic systems encompassing networks of hospitals and primary care units; link together through global networks, alliances, and consortia; and nurture a culture of critical inquiry* (Davies, 2006.)*"* . This recognizes the role of medical education and therefore medical research as major means for ensuring the human capital that is needed by the health care sytems everywhere with large possibilities of cooperation among regions and countries (Frenk et al., (2010)).

[94] http://www.iom.int/jahia/Jahia/mida-africa/.

III.2.2 Migration of Medical Doctors: A Win-Win Framework

First introduced by Aumann (1959, 1960, 1961, 1981, 1985a), cooperative games with transferable utility has seen many economic applications (see for example, Aumann & hart, 2007). In the following, we opt for a cooperative game theoretic model with transferable utility and side payments, as in Sherali & Qing (2000) and Kaneko and Wooders (2004), for example. An agreement on the distribution of payoffs generates an accord that is acceptable to all parties involved. Cooperation is beneficial to all.

In what follows, we draw on a framework with "utility transfer" and "side payments" to formalize the relationship between a sending and a receiving country. The intuition behind this approach is that a coalition can be formed based on an agreement between for example, Morocco and one country from the European Union, or between Morocco and the European Union. This agreement would set the terms of trade between the two countries in defining the checks and balances for a free circulation of medical doctors. We develop a framework for collaboration based on the following guiding principles: (i) Cooperation between sending and receiving countries under the umbrella of the Global Health system can increase global performance; however (ii) diverting resources for cooperation may degrade individual performance, that's why (iii) a natural approach is to somehow compensate sending countries for their cooperation.

Cooperation in what follows is a coordinated effort between a receiving and a sending country in order to promote the benefit from cooperation in the medical sector to both parties in a coalition. The goal of cooperation framework is to form a coalition that will govern the movement of doctors within the cooperation space under the umbrella of the global health system. In this framework, we will adopt and heavily borrow from the structure of a game with transferable utility and side payments described in Kaneko and Wooders (2004.)

In this model, assumptions are adopted and are related to:

- Logistics such as how countries actually coordinate payoffs and establish checks and balances to enforce binding agreements will not be taken into consideration.
- Complete information symmetry, in other words, each country participating in this cooperative game has complete information of the characteristic payoff functions of the game.

- Both parties have an equal bargaining power.
- All players weigh their payoffs by the same measure. In other words, the payoff of every coalition can be distributed to participants using a metric that is recognized by all parties, money for example.
- No income effects on the choice behavior of the players, entailing that the players are not faced with a boundary condition.

III.2.2.1Transferable Utility and Side Payments

1. Cooperative Framework

A *n*-person cooperative game with transferable utilities is a pair[95] [N, *v*(S)], where *N ={1,2, ..., n}* is a finite, non-empty, set of players, and where each non-empty subset of players $S \subset N$ is called a *coalition*.

In this cooperative game, every coalition *S* is assigned its worth by a characteristic function, denoted as *v(S)* and where *v*: $2^N \rightarrow \mathbb{R}$, where 2^N is the set of all subsets of N. The function *v* allocates to each coalition *S* in 2^N the maximum payoff that can be achieved if the players in the cooperation cooperate. So an allocation of *v*(S) to parties in the coalition *S* is defined by a payoff vector $x \in \mathbb{R}^n$ allocates outcome $x \in \mathbb{R}$ to player $i \in S$. For a vector payoff $x \in \mathbb{R}^n$ and a coalition S, the total payoff to players is: $\{x_i\}_{i \in S}$, such that $\sum_{i \in S} x_i = V(S)$.

The valuation function *v* can be characterized by the following axioms:

- By convention, v(ø) = 0 where ø is the empty set.
- The characteristic function is *super-additive*, in other words, the union of any two disjoint groups of players never diminishes the total benefits: $v(S \cup T) \geq v(S) + v(T)$, holds all coalitions S and T, with $S \cap T = \emptyset$. For any two disjoint coalitions *S* and *T of N,* superadditivity implies that the coalition is at least any beneficial to its members as the non-cooperative payoffs they would have gained if they did not join the coalition. In this regard, the coalition is optimal.
- *v* is convex:

$$v(S) + v(T) \leq v(S \cup T) + v(S \cap T)$$

[95] We generally follow the notation given in Wooders and Kaneko, 2004.

The convexity condition is simply a stronger form of the super-additivity condition._A transferable utility game is convex if the marginal contribution of each player increases with the size of the coalition they joins. In other words, it is valuable to join a larger coalition than a smaller one. Convexity guarantees that the core is non-empty.

2. Transferable Utility

A game [N, *v*(S)] is a cooperative game with transferable utility is game where within the coalition each player has the possibility to transfer any amounts of utilitymoney, including money, to the another player within the same coalition. In what follows, we adopt the following valuation function (Kaneko & Wooders, 2004)

$$v(S) = \max \sum_{i \in S} u_i(x_i) \; subj\,ect\;to \tag{1.0}$$

$$\sum_{i \in S} x_i = \sum_{i \in S} \omega_i \; and \; x_i \in X \; f\,or\; all \in S$$

In this setting, Ui : X × $\mathbb{R}$ → $\mathbb{R}$ is the payoff function for player i, where *X* is outcome space for player i and where *x*i and ω_i are, respectively, the outcome and the endowment of commodities defined on the set *X*. In using the characteristic function in (1.0), we focus on transferable utilities where agents can transfer some utility and not necessarily compare utilities. It is assumed here that *V(S)* describes the Pareto frontier (For the proof, see Kaneko & Wooders, 2004.) In this case, the no income effects condition means that the sum *v(S)* is independent of the distribution of the money holdings among the members of *S*.

3.Transferable Utility and Side Payments

To make up for any inequities that might rise due to the exchange in commodities and other between members of a coalition, we allow for the transfer of money from one member of the coalition to another. Transfers of money between members of the same coalition, or "Side payments", are a rule of the game and are not a prerequisite of the utility function. The postulation of "side payments" is independent of the assumption of transferable utility (see for example, Luce ad Raïffa (1985.)

In the following, we consider side payments in the context of transferable utility. Using the setting from (1.0), we represent a transferable utility with side payment as

$U_i(x,\xi)$, where the value Ui(x, ξ) represents the utility from the set of outcomes *x* and the increment (or decrement) ξ of money from a given initial level. The value ξ represents the amount of money that player i can use to buy goods outside of the cooperation set.

If we assume quasi-linearity, *Ui* is then linearly separable with respect to ξ, so *Ui* could be re-written as

(1.1) $U_i(x,\xi) = ui(x) + \xi$ For all $(x,\xi) \in \mathrm{X} \times \mathbb{R}$.

The utility function of every participant is function of the transfer of utility, i.e. the transfer of money, which takes place between the players. More precisely, if $x_0 \in X$ is a randomly chosen initial condition, then for a utility function $U_i(x, \xi)$ of form (1.1), it holds that for any $x \in X$

$$U_i(x,\xi) = Ui(x_0, u_i(x) - u_i(x_0) + \xi)$$

Under the assumption that there are no income effects and for an initial level of doctors, x_0, the term $u_i(x) - u_i(x_0)$ stands for the compensation that covers the change in utility from x_0 to x and could be negative, implying a transfer of money in the opposite direction. In other words, $u_i(x) - u_i(x_0)$ could be reformulated as the transferable pay-offs of the coalition *S* or the side payments made by the receiving country to the sending country.

Transferable utility and side payments imply that there a means of exchange that is acceptable to all parties in the coalition, and that the utility of the players is additive with respect to the utility transfer and/or the side payments. In other words, a transfer from player 1 to player 2 would increase utility of player 2 and decrease that of player 1 by the amount of the transfer, without opposing Pareto optimality.

4. Payments

"Side payments" in this context involve that in addition to any kind of transferable utility implied by the outcome x, agents can additionally exchange any quantities of money. In this regard, an imputation is a payoff distribution that is feasible, efficient and rational.

An imputation of *v* can be defined as a vector $a \in \mathbb{R}^n$ with $\sum_{i=1}^{n} a_i = v(N)$ *and* $a_i \geq v(\{i\})$ for all $i \in \{1,...,n\}$ under the following conditions:

- A payoff vector $(a_i)_{i\in S}$ is said to be *feasible* for a coalition S if and only if

$$\sum_{i\in S} a_i \leq v(S)$$

- A payoff vector $(a_i)_{i\in S}$ is said to be *individually rational* if and only if $\forall i \in N$,

$$a_i \geq v(\{i\}) for\ all \in N \text{and} \sum_{i\in N} a_i = v(N).$$

This states that cooperation guarantees to each layer at lease what he/she can secure alone.

- *Collective rationality.* For any coalition $C \subseteq N$, $\sum_{i\in C} a_i = v(C)$, in other words, no utility is lost.
- *Pareto Optimality*. This axiom means that no agent can improve her own utility without hurting somebody else,

$$\sum_{i\in N} a_i = v(N).$$

In what follows, we will rely on two major approaches, considered fair, to pin down plausible solutions which satisfy the three above conditions. First, solutions have to be fair to both partners; in which case, we will discuss the core (Gillies, 1953), as a fair solution. Second, solutions have to also exhibit fairness, in this regard, we will the discuss applications of the Shapley value (Shapley, 1953).

5. The Core

The core of a cooperative game is an outcome of cooperation which provides enough incentives for the agents to remain within the grand coalition. In other words, the core is a setting which is able to sustain a stable cooperation. The core is a set of efficient allocations from a coalition that based on the notion of stability. To every transferable utility game, the core assigns a set such as:

$$Core(v) = \left\{ x \in \mathbb{R}^n / \sum_{i\in N} x_i = v(N)\ and\ \sum_{i\in S} x_i \geq v(S) for\ all\ S \subset N \right\}$$

This condition above states that no coalition *S* could better on its own by deviating from the grand coalition *N*. In other words, the core solution is stable when all players in the grand coalition gain imputations greater than their stand alone payoffs, *v(S)*.

Moreover, a stable game is nonempty and since every convex game is, by definition stable, it is therefore the case that the core is nonempty for every convex game. The convexity of the core implies that the Shapley value, a vector of marginal payoffs, lies within the core.

6. The Shapely Value

While the core is an easy solution to compute, it is based on the marginal contribution of every member of the coalition and works for any ordering of the agents. However, the marginal contribution scheme is unfair because it depends on the ordering of the agents. One way to make it fair is to average over all possible orderings, which is exactly the objective of the Shapley value which based on the notion of fairness. For a description of Shapley value see, for example, Hart (2007), Aumann (1985b), Burdett and Coles (1997, 1999), Sattinger (1995), Den Brink (2007), and for economic applications see (Delacroix, 2003.)

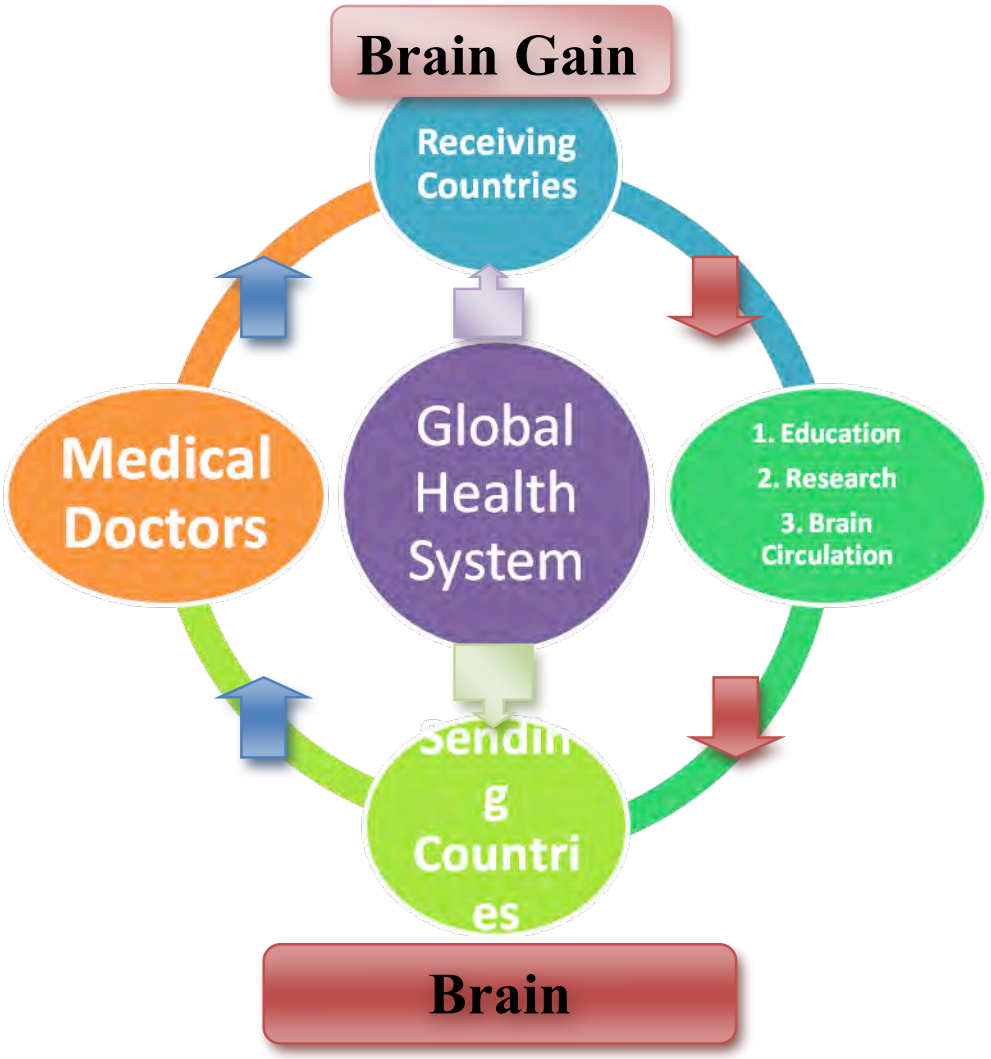
The Shapley value of player *i*, i $i \in S$ in a game is his/her expected marginal contribution to a random coalition- defined as the weighted mean of the marginal contributions *v(S U{i})−v(S)* of player *i* in all coalitions. Let the marginal contribution of agent *i* in ordering Γ is *MC(i,* Γ*),* then the Shapley value is $\sum_{\Gamma} \frac{MC(i,\Gamma)}{(n!)}$, where n is the number of coalition members. The following axioms describe the characterization of the Shapley value (Hart, 2007) with:

- *Efficiency*. A solution is efficient if the total payoff equals the value of the grand coalition, i.e, $\Sigma_{i \text{ in } N} u(i)$ equals *v(N).*
- *Symmetry*. If two players have the same value added to the coalition, they values are identical.
- *Dummy player*. If a player contributes nothing to the coalition, he/she gets a value of zero.
- *Additivity*. The value of the sum of two games is the sum of the values of the two games.

III.2.2.2 Discussion and Public Policy Implications

The movement of health workers has proven to be strong and irreversible. However, not all countries involved have benefited equally. An outdated way of looking at immigration has been to over emphasize the pejorative implications of brain drain. However, the picture is not as dim as it seems. Sending countries can also benefit from exporting its human skilled labor force, especially via the promotion of brain drain. In the previous section, we have summarized how a cooperative framework, implying utility transfer and side payments, could be used to analyze the implications of migration of highly skilled health force. In this frame, there will be free movement of medical doctors between the two rims of the Mediterranean Sea in a cooperative framework indicating that immigration can be a "win-win" opportunity for all parties involved. Figure III.2.2.2 suggests that the immigration of doctors can benefit to both the sending and receiving countries, and therefore, the immigration of medical doctors is not necessarily a zero-sum game.

Figure III.2.2.2: Brain Drain/Gain in a Cooperative Framework



In this sub-part, we argue that the free movement of medical doctors is not necessarily a zero-sum game, and is more likely to generate positive spillovers on both the sending and the receiving countries. The countries of the north and south rim of the Mediterranean, especially those of North Africa and those of the European Union, have a tremendous interest in building a coalition to curb the negative implications of the migration, to build a good health capacity and to promote a free and stable flow of health professionals. A coalition between the North African countries, especially Morocco, Algeria and Tunisia, with countries of the European Union seems to be a natural extension of the cultural, economic and historical ties that exist between these countries for centuries back. First of all, proximity is a major contributor to the migration of the North African health force to

Europe. Second, in the North African countries before cited, higher education- including medical school- is undertaken in the French language which facilitates tremendously the integration of the migrating doctors in the French health industry, for example. Finally, historic ties (colonization and otherwise) have established a strong flow of trade between countries of both rims of the Mediterranean. Therefore, trade flows, among which trade in health, for do not have to reinvented; they already take place in a sizable manner.

This coalition of the North-South Mediterranean countries could be a good framework to negotiate fair terms for health labor migration between north and south countries of the Mediterranean Sea. The main concern for the coalition would be to define a cooperative framework with transferable utility. More specifically, it is imperative to negotiate the terms under which it would become beneficial for the South player to transfer utility from the investment in health workers to the northern player without affecting the aggregate utility of the coalition. In other words, the players of the south rim would allow for the free flow of health workers to the other members of the coalition, i.e., the countries of the European Union against a set of deterministic settlements. First, the coalition has to determine/negotiate the payoff that will be awarded to every player in the coalition. The Shapley value could be determined using as indicators, for example, (i) the marginal contribution of every player and (ii) the initial endowments in health labor force of the originating country. Second, at the receiving end of the coalition, the players should allow and encourage circular migration and privilege short term migration contracts. Several countries have temporary migration programs that cater to health professionals. It is the case for example of several OECD countries and others among which, for example, Austria, Belgium, Denmark, Finland, France, Germany, Italy, Luxembourg, Netherlands, Spain, United Kingdom, Norway, Switzerland, Canada, Australia, Japan, New Zealand and the United States (OECD, 2007.) Third, the host countries should seriously consider compensating the originating countries for their losses in tax collection by sending the taxes on income levied on their territories back to the countries of origin. Lastly, and in the same context of transferable utility, Northern countries should decide on a health targeted foreign aid program aimed at transferring knowledge and supporting harmonization of the policies and practices on both sides of the rim. This aid program, for

efficiency, should be coupled with a set of accountability rules by which the receiving countries would abide.

The coalition would be further strengthened if (i) it emphasizes the harmonization of policies related to the health industry and standards and (ii) if side payments are binding. In terms of infrastructure, capacity production and levels/quality of the human capital, the members of the coalition are heterogeneous, but individual preferences are public knowledge because we are assuming information symmetry and knowledge sharing. This heterogeneity in initial endowments warrants the coordination in standards and the differentiation in policies and the transfer of knowledge.

Side payments could help make the coalition stable for several reasons. First, it is an efficient way of balancing out power within the coalition in favor of the south rim countries. Second, with side payments the winners of a collective project can compensate the losers, such that total utility can be realized as a Pareto enlargement.

Side payments should be binding as they are the major means for the losing party, i.e., the North African countries, to internalize the negative externalities from free trading within the coalition in health workers. Side payments are a compensation for the negative externalities incurred from free trading within the coalition in health workers and could be summarized in (i) a loss in investment in education, (ii) a loss of highly trained skilled labor force, (iii) a loss in public revenues due to the loss in taxes and social security revenues and (iv) an increase in wages in certain vital sectors due to the shortage in labor.

Side payments are necessary to induce and constrain the participation of southern Mediterranean countries in an efficient coalition that can also satisfy prevailing notions of fair trade. In light of their importance, side payments should be decided at the level of the European Council where the heads of states and prime ministers have more discretion and more weight in decision-making.

A framework for a win-win situation can only thrive if it is backed by effective governance. Utility transfer, side payments as well the aid to development to the health sector should not be thought solely as a compensation for the loss in human capital and the loss in tax payments but as a means to invest in the knowledge capacity of the country in the short run as well as in the long run.

In the short run, the country of origin should invest in medical human capital to build a medical capacity. This investment could be undertaken using a portion of the side payment received from the hosting countries. The birth country should also emphasize quality of education and the standards of practice in the medical profession. This could be, for example, promoted via the participation of the Diaspora abroad. The Diaspora could help with building medical capacity in many ways, out of which: (i) what Kana (2009) terms as "*virtual participation*," whereby the Diaspora can be an active participant in knowledge flow and network building at a low cost, (ii) Diaspora can also help in helping national students have access to international reputable schools.

In the short run, the birth country can also promote "*professional certification*" Kana (2009) and "*standards homogenization*" (Segouin et al., 2005.) Segouin et al. (2005) has been calling for the development of international standards in "*medical education and health care delivery*" can be an important levy to promote the quality of health services everywhere. Therefore, promoting an education and a system of health care that is at par with the rest of the world can be a major contribution to the medical and technological capacity of the birth country.

In the long run, a more sustainable strategy for the birth country is to invest in brain circulation as was the case in China, India and South Korea (see for example, Balaz et al., (2004), Chacko (2007), Gaillard et al. (1997) and Lee (2008).)

While the brain drain pattern only benefits the receiving country, brain gain benefits the origin country as well. The host country benefits from the "past investment" and the "future stream of revenues[96]" generated by the skilled migrant. Once the medical migrant returns home, the country of origin benefits from the new skills and knowledge has acquired prior to his/her return.

(i) The importance of mobility stems from its contribution to the creation and diffusion of knowledge. Once back to their countries of origin, the returning medical doctors would diffuse knowledge to their colleagues by direct contact in the workplace. Using data on nineteen OECD countries during 1980-1990, Le (2008) has found that international labor movement transfers technology to

[96] To use the terminology of Haffajee and Hazelhurst (2001.)

both ends of the migration and circular migration-the receiving and originating countries.

(i) Brain circulation can also contribute to the diffusion of "*non-codified knowledge*," in other words, knowledge that is implied but not formally stated and which can only be transmitted via close contact (OECD, 2008).

(ii) There is also the possibility to contribute to local *R&D*. The returning medical doctors can facilitate knowledge exchange and collaboration with the country that had hosted the medical doctor by building or reinforcing research networks.

(iii) Additionally, knowledge can also spill to organizations and firms taking advantage of the new skills. Aside from the possibility that the returning migrant can become themselves in the local economic activity as entrepreneurs.

Circular migration rates tend to be greater in countries that are "*at a greater cultural, economic and geographic distance from the host country*," OECD (2008.) Moreover, this tendency is motivated by the existence of a decent local labor market and family ties. However, the country of origin can act as a catalyst to favor brain circulation.

To fully benefit from the different advantages from brain circulation, the country of origin should invest in an infrastructure that is able to absorb the returning medical doctors. Since one the major reasons for the migration of highly skilled labor is the lure of better research funding, countries of origin should:

(i) Create a good environment for science innovation and promotion, including (i) the creation of an advantageous legislation for researchers both national and international, and (ii) the introduction of a beneficial taxation system for researchers (as suggested in Daugeliene & Marcinkeviciene, 2009.) Investing in medical education could also attract foreign students, especially from Africa, and therefore generate more revenues for the country and establish its reputation as a provider of educational services.

(ii) Remove barriers to trade so as to curb brain drain and encourage brain circulation. First, if national scientists' mobility is encouraged so that they can acquire better skills and avoid their migration. Second, migration might be a

great incentive for medical students to develop more and better skills. In other words, immigration could provide an incentive for the nationals to acquire education/skills related to the medical field, whereby the birth country can become an exporter of skills, which increases expected return of personal and domestic education and therefore promotes investment in education and research.

(iii) Build and/or tighten ties with the Diaspora, and their networks, which could be an important conduit of knowledge flows and increased binds with foreign research institutions (Tung, 2008; Mahroum, 2005; Teffera 2004.)

(iv) Invest a sizable portion of the money that the sending countries would receive from the host countries in building an excellent infrastructure, including information technology, to support a diverse web of channels of health delivery as discussed by Chanda (2002). On one hand, the new communication technology would facilitate the contact with the Diaspora (Teffera, 2004.) On the other hand, it would facilitate the transborder outsourcing of some medical services such as telehealth, i.e., the electronic delivery of health services, where a country like the USA is a leader. Furthermore, the eHealth Consumer Trends are in a rapid increase and south Mediterranean countries should build the right capacity to take advantage of this niche (Andreassen er al., 2007; Kummervold, 2008.)

(v) Take advantages of the opportunities offered by the rising "medical travel and health tourism." An article in the Guardian (2005) cites that "*A study by the Confederation of Indian Industry (CII), and McKinsey consultants estimated "medical tourism" could be worth 100bn rupees (£1.21bn) by 2012. Last year some 150,000 foreigners visited India for treatment, with the number rising by 15% a year*." This niche covers a wide range of practices from Bypass surgery to cancer treatment to liposuction and involves many countries such India, Thailand, Cuba, Brazil among others.

Immigration of highly skilled health workforce could be a welcome phenomenon if it has as corollary a public policy that fosters the necessary conditions for a "*win-win*" situation, as showcased above. The accumulation of human capital coupled with a good

infrastructure, an environment that furthers *R&D* and a sound political system would promote economic productivity and development as well as "brain circulation" which in turn will further deepen the economic development of the country of origin. Therefore, allowing long-term as well as temporary migration of medical doctors could be an important locomotive for growth for both the sending and receiving country, as well as the world's global health system.

If properly managed, migration of medical doctors can lead global health benefits. "*Global market forces work efficiently in settings where domestic markets are competitive and non-exclusionary, regulatory institutions are strong, asset concentration is moderate, access to public health services is widespread, social safety nets are in place, and rules of access to global markets are non-exclusionary. Under these conditions, globalization reduces opportunistic behaviour, rewards effort and entrepreneurship, captures economies of scale in production, increases employment opportunities, and improves welfare by raising earnings, and reducing the prices of consumer goods*." Cornia (2001) A global efficient market can promote the integration of small markets into the world health system and sustain a global knowledge based economy, therefore, promoting knowledge transfer from those privileged to those less privileged.

Conclusion

The accumulation of human capital, via a sustained investment in education and research, the improvement of institutions and infrastructure and the exploitation of the Diaspora and its networks will eventually lead to promoting productivity and would, in the long run, encourage "brain gain" lead to building a comparative advantage in the medical sector in the sending country. Moreover, immigration of medical doctors benefits both sides- the sending and the receiving ends. The receiving country does take advantage of (i) the extra high skilled medical work force to increase its *R&D* and economic activity, (ii) the increased flows of knowledge collaboration and ties with foreign institutions (iii) the increased enrollment of foreigners in the national medical programs, and (iv)the possibility of exporting national technology and know-how. Additionally positive spills from the free movement of medical doctors can automatically trickle to the Global health

system, and therefore to the rest of the word. Medical force movement between countries can generate a better (i) international flow of knowledge, international matching between employers and job seekers in the medical sector, (iii) international research and health standards, overall.

In sum, the free circulation of medical doctors, especially and of medical labor force, in general, is a vital process, which fosters countries' competitiveness as well as a world's knowledge-based economy.

Overall Conclusion

The detailed objectives followed throughout this research focused on the identifying of an economic framework capable of capturing the major determinants of the emigration of medical doctors from MENA and ECE countries. Besides, that this research was planned to show the health needs and mainly those related to medical doctors in relation to past and on-going health policies. The importance of the comparisons between MENA and ECE was also suggested. This should lead to an economic policy framework accounting for the benefits of both sending and receiving countries.

Several relevant research questions were addressed to include the assessment of trends and needs of medical doctors in the countries composing the two selected regions. In this way, migration stocks and flows with their relation to the medical education system are underlined to be major sources of physicians. Further descriptive statistical analysis on available data was intended to produce further knowledge about benefits and costs with focus on legal constraints and procedures related to this type of migration. Specific analytical models were needed to assess the major analytical determinants of emigration decisions in relation to the selected regions and countries. Specific focus on the current policies was also needed in order to characterize the on-going environment governing health care and related inputs with focus on physicians. Finally, what type of new framework could be suggested to account for the mutual interests of both sending and

The results to be attained will contribute to a better clarification and understanding of the emigration of medical doctors from these two regions that entertain direct and indirect economic, social and cultural relationships with the EU. The gains and benefits from this research can be expected to generate a:

- Conceptual framework for analyzing the trends and major determinants of the emigration of medical doctors from MENA and ECE to EU,
- Set of instruments that are useful for integrating education, health care, employment and wages in the understanding of emigration patterns,
- Means for further integration of regional policies in MENA and ECE countries and regions,
- Basis for economic and social policy coordination and negotiation between EU and the two regions analyzed.

The attainment of the above objectives and the development of the related research questions have been made possible with the extensive use of the available publications, the mobilization of the existing data from both national and international sources. Besides that, the use of descriptive quantitative and qualitative analyzes and economic models with econometric implementations and hypotheses testing have been used with the available data. Finally, a cooperative game theoretical framework has been introduced as the basis for the cooperative model suggested by this report. The outcomes attained from such analyzes have been enriched through looking at the perspectives of medical education and research in Morocco as a case of a source of emigration in MENA. Liekly comparisons with ECE countries could be easily understood from the chapter devoted to ECE. Furthermore, some 100 doctors practicing in Morocco are interviewed to better confirm the determinants of emigrations.

The overall results attained show that the emigration as stocks and flows of physicians is determined by the cost of medical education, the selection process for enrollment, demographic issues but the major determinant is the salary provided in countries of destination. Comparisons of relative wages provide patterns of emigration among groups of countries. It has been observed that given the wage benefits, more physicians from

MENA countries could be moving to practice in the EU. Also, medical doctors from ECE could move to practice in most MENA countries.

Given that emphasis made on the role of medical education in the emigration decision of physicians, the cost of medical education has been considered as an important element in the emigration reasoning. It has been observed that the Other European Countries have the highest education costs in average when considering all groups except the Other MENA Countries (because of their special context). The ECE and the MENA countries have approximately comparable tuition fees with some exceptions such as Morocco, Tunisia and Yemen. These observations confirm the pattern of emigration defined above. For example, a MENA student can seek medical education in an ECE Country and then emigrate to one of the other European Countries to practice medicine.

However, the effect of the increasing high costs of medical education can have reverse effects on the affordability of medical education to good applicants from poor families. Providing medical education for wealthier students increases their chances of emigration to wealthier countries and leaving the developing country of origin in shortage of skilled medical doctors and in public health crisis. Increased costs of medical education can also create long-term indebtedness for medical students. The elevated cost of medical education represents a major problem. This evidence leads to future studies on the role of medical schools, governments and the public sector in solving the present problem.

More detailed variables are also established to explain emigration decisions both in MENA and ECE countries. They include relative salaries, education costs besides behavioral parameters such as those related to attitudes towards risk. Here a theoretical model derived from Stark's et al. (2005) with the introduction of risk aversion (Driouchi et al., 2009), applications to most sending countries in the MENA and ECE regions, appears to be promising. The test of convergence between the observed values based on Docquier et al. (2010) data and the theoretical values obtained from the model is statistically conclusive. Parameters and indices are then derived from the domestic relative human capital for each country in the two regions. They all show that these economies are enjoying globally brain gains in relation to the emigration of medical doctors. While risk neutrality applies to most countries, some economies show moderate risk aversion. The gains attained appear to exhibit low values and lower levels of the

maximum level of emigration rates that would sustain these benefits. These results could benefit from further availability of more accurate databases on emigration, wages, and estimates of risk aversion and valuation of education.

These trends are likely to worsen with the increasing shortages in medical doctors. The data available suggest potential shortages of medical doctors in some European countries. Indeed, there is evidence that some countries are looking to fill in vacancies from either neighbouring countries or from further away. The demographic trends in many European countries, in particular, a growing elderly population, may increase health care services and this would encourage the potential inflows of medical doctors in the next years.
It is also crucial to assess the impact of health workforce mobility on national health systems. The negative impact of the out migration of health workers from some developing countries to developed countries was highlighted in the World Health Report 2006. Besides that, major needs are developing for remote and rural areas.
The above trends have been confirmed with the analysis of the EU.

The specific analysis conducted on the EU with its expansion confirm the above needs but underline also the restrictions related to medical practice by international physicians. Acquiring medical education in Europe may have less limiting power. New members from ECE may also have less constraint in comparison with non-members and those from MENA. But, this has not reduced the increasing migration flows from MENA to EU in the last years. Europe will have to cope with aging population and with growing needs in a diversity of locations with emphasis on rural areas. Thus, policies encouraging migration from MENA to Europe would be in place.
The empirical evidence suggests that medical doctor's emigration in European Union appears because of poor distribution of physicians, low internal mobility and inappropriate skill mix. In case of migration from CEE countries to Western EU countries, the main reasons are differences in working conditions, remuneration level and career opportunities. The same factors apply in countries of the MENA region, except that oil exporting countries are easily hiring medical doctors and enhancing the capacity

of their medical school. The other countries are still concerned about the emigration of medical doctors.

Finally, it has been shown that within the global health system that has been largely demonstrated in this report, the free movement of medical doctors is not necessarily a zero-sum game. It is more likely to generate positive spillovers on the sending countries. The accumulation of human capital, via a sustained investment in education and research, the improvement of institutions and infrastructure and the exploitation of the Diaspora and its networks will eventually lead to promoting productivity and would, in the long run, encourage "brain gain" lead to building a comparative advantage in the medical sector in the sending country. Moreover, immigration of medical doctors benefits both sides- the sending and the receiving ends. The receiving country does take advantage of:
(i) The extra high skilled medical work force to increase its R&D and economic activity,
(ii) The increased flows of knowledge collaboration and ties with foreign institutions
(iii) The increased enrollment of foreigners in the national medical programs, and
(iv) The possibility of exporting national technology and know-how.

When looking closely to a specific country (Morocco) of the MENA region, it appears that local needs of healthcare are increasing. Furthermore, enhancements in quality of health services are also expected. This is happening under the effects of demographic changes, income enhancement and urbanization but also with the promotion of social programs. While these demand side impacts are progressively increasing in the future, the supply side is also diversifying the means of providing better services. In this process, while medical research needs to be emphasized, the deficit in medical doctors is considered on medium term, to be increased. Medical education and research are then becoming central parts for satisfying the pressure from increased health demand. When accounting for the emigration of medical doctors, the pressure of demand becomes even more important. Away from health technologies that need continuous updating, human resources and especially medical doctors and human expertise appears to be crucial. The cooperative frameworks with other countries and mainly with the EU and the countries composing it can be an important source for satisfying both the needs of the EU and those

of Morocco. In this process, research and education in the medical area can be the engine for the acceleration of bilateral and multilateral exchanges in health services.

Moroccan medical professionals that have stayed in Morocco have been surveyed about the determinants of their decisions to not emigrate. Their answers appear to be confirming both the factors influencing migration and also the gains to be attained from the cooperative framework suggested in this study.

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Appendices (to part II only)

Appendices to Part II

Sub-part II.1:

Appendix I

Appendix I provides the proofs to support different sections in the theoretical part. These proofs are given for the general case of risk aversion as risk neutrality is a particular case (α=1).

Demo 1: Signs of the first and second derivatives of H

$$H = (1-m)N\left[\frac{c}{\gamma a^{\alpha}\left[m(\beta_D^{\alpha}-\beta_S^{\alpha})+\beta_S^{\alpha}\right]}\right]^{\frac{1}{\gamma\alpha-1}}$$

$$\frac{\partial H}{\partial m} = N\left[\frac{c}{\gamma a^{\alpha}}\right]^{\frac{1}{\gamma\alpha-1}}\left\{\frac{1-m}{1-\gamma\alpha}(\beta_D^{\alpha}-\beta_S^{\alpha})\left[m(\beta_D^{\alpha}-\beta_S^{\alpha})+\beta_S^{\alpha}\right]^{\frac{1}{1-\gamma\alpha}-1}-\left[m(\beta_D^{\alpha}-\beta_S^{\alpha})+\beta_S^{\alpha}\right]^{\frac{1}{1-\gamma\alpha}}\right\}$$

$$\frac{\partial H}{\partial m} = N(1-m)\left[\frac{c}{\gamma a^{\alpha}}\right]^{\frac{1}{\gamma\alpha-1}}\left[m(\beta_D^{\alpha}-\beta_S^{\alpha})+\beta_S^{\alpha}\right]^{\frac{1}{1-\gamma\alpha}}\left\{\frac{\beta_D^{\alpha}-\beta_S^{\alpha}}{1-\gamma\alpha}\left[m(\beta_D^{\alpha}-\beta_S^{\alpha})+\beta_S^{\alpha}\right]^{-1}-\frac{1}{1-m}\right\}$$

$$\frac{\partial H}{\partial m} = H\left\{\frac{\beta_D^{\alpha}-\beta_S^{\alpha}}{(1-\gamma\alpha)\left[m(\beta_D^{\alpha}-\beta_S^{\alpha})+\beta_S^{\alpha}\right]}-\frac{1}{1-m}\right\}$$

Let $A = \dfrac{\beta_D^{\alpha}-\beta_S^{\alpha}}{(1-\gamma\alpha)\left[m(\beta_D^{\alpha}-\beta_S^{\alpha})+\beta_S^{\alpha}\right]}-\dfrac{1}{1-m}$

So, $\dfrac{\partial H}{\partial m} = H.A$

$$\frac{\partial^2 H}{\partial m^2} = H'A + HA' = H(A)^2 + HA' = H\left(A^2 + A'\right)$$

$$A^2 = \frac{\left(\beta_D^\alpha - \beta_S^\alpha\right)^2}{\left(1-\gamma\alpha\right)^2\left[m\left(\beta_D^\alpha - \beta_S^\alpha\right)+\beta_S^\alpha\right]^2} + \frac{1}{\left(1-m\right)^2} - \frac{2\left(\beta_D^\alpha - \beta_S^\alpha\right)}{(1-m)(1-\gamma\alpha)\left[m\left(\beta_D^\alpha - \beta_S^\alpha\right)+\beta_S^\alpha\right]}$$

$$A' = -\frac{\left(\beta_D^\alpha - \beta_S^\alpha\right)^2}{\left(1-\gamma\alpha\right)\left[m\left(\beta_D^\alpha - \beta_S^\alpha\right)+\beta_S^\alpha\right]^2} - \frac{1}{\left(1-m\right)^2}$$

$$A^2 + A' = \frac{(1-m)\left(\beta_D^\alpha - \beta_S^\alpha\right)^2 - 2\left(\beta_D^\alpha - \beta_S^\alpha\right)(1-\gamma\alpha)\left[m\left(\beta_D^\alpha - \beta_S^\alpha\right)+\beta_S^\alpha\right] - (1-m)(1-\gamma\alpha)\left(\beta_D^\alpha - \beta_S^\alpha\right)^2}{(1-m)\left(1-\gamma\alpha\right)^2\left[m\left(\beta_D^\alpha - \beta_S^\alpha\right)+\beta_S^\alpha\right]^2}$$

$$\frac{\partial^2 H}{\partial m^2} = H\left(\beta_D^\alpha - \beta_S^\alpha\right)\left\{\frac{(1-m)\left(\beta_D^\alpha - \beta_S^\alpha\right) - (1-m)(1-\gamma\alpha)\left(\beta_D^\alpha - \beta_S^\alpha\right) - 2(1-\gamma\alpha)\left[m\left(\beta_D^\alpha - \beta_S^\alpha\right)+\beta_S^\alpha\right]}{(1-m)\left(1-\gamma\alpha\right)^2\left[m\left(\beta_D^\alpha - \beta_S^\alpha\right)+\beta_S^\alpha\right]^2}\right\}$$

$$\frac{\partial^2 H}{\partial m^2} = H\left(\beta_D^\alpha - \beta_S^\alpha\right)\left\{\frac{\gamma\alpha(1-m)\left(\beta_D^\alpha - \beta_S^\alpha\right) - 2(1-\gamma\alpha)\left[m\left(\beta_D^\alpha - \beta_S^\alpha\right)+\beta_S^\alpha\right]}{(1-m)\left(1-\gamma\alpha\right)^2\left[m\left(\beta_D^\alpha - \beta_S^\alpha\right)+\beta_S^\alpha\right]^2}\right\}$$

Sign of $\frac{\partial^2 H}{\partial m^2}$ = Sign of $\left\{\gamma\alpha(1-m)\left(\beta_D^\alpha - \beta_S^\alpha\right) - 2(1-\gamma\alpha)\left[m\left(\beta_D^\alpha - \beta_S^\alpha\right)+\beta_S^\alpha\right]\right\}$

So, this sign depends on the following conditions:

If $\frac{\beta_D^\alpha}{\beta_S^\alpha} < \frac{(2-\gamma\alpha)(1-m)}{\left[\gamma\alpha - m(2-\gamma\alpha)\right]}$ then $\frac{\partial^2 H}{\partial m^2} > 0$

If $\frac{\beta_D^\alpha}{\beta_S^\alpha} > \frac{(2-\gamma\alpha)(1-m)}{\left[\gamma\alpha - m(2-\gamma\alpha)\right]}$ then $\frac{\partial^2 H}{\partial m^2} < 0$

If $\frac{\beta_D^\alpha}{\beta_S^\alpha} = \frac{(2-\gamma\alpha)(1-m)}{\left[\gamma\alpha - m(2-\gamma\alpha)\right]}$ or if $m = \frac{\left[\gamma\alpha\beta_D^\alpha + \left(\gamma\alpha-2\right)\beta_S^\alpha\right]}{\left(\beta_D^\alpha - \beta_S^\alpha\right)\left(3\gamma\alpha-2\right)}$ then $\frac{\partial^2 H}{\partial m^2} = 0$

Demo 2: Conditions related to the sign of H''

$0 < \gamma < 1$

$\alpha \le 1$

$\gamma\alpha < 1$

$-\gamma\alpha > -1$

$2 - \gamma\alpha > 1$

$-\mathrm{m}(2-\gamma\alpha) < -\mathrm{m}$

$\gamma\alpha - \mathrm{m}(2-\gamma\alpha) < 1 - \mathrm{m}(2-\gamma\alpha) < 1 - \mathrm{m}$

Then, $\gamma\alpha - \mathrm{m}(2-\gamma\alpha)$ is either positive or negative.

When $\left[\gamma\alpha - \mathrm{m}(2-\gamma\alpha)\right] > 0$, then $\frac{1-\mathrm{m}}{\gamma\alpha - \mathrm{m}(2-\gamma\alpha)} > 1$

$\frac{(1-\mathrm{m})}{[\gamma\alpha-\mathrm{m}(2-\gamma\alpha)]}>1$ means that $\frac{(2-\gamma\alpha)(1-\mathrm{m})}{[\gamma\alpha-\mathrm{m}(2-\gamma\alpha)]}>(2-\gamma\alpha)$

So if $\frac{\beta_{\mathrm{D}}^{\alpha}}{\beta_{\mathrm{S}}^{\alpha}}>\frac{(2-\gamma\alpha)(1-\mathrm{m})}{[\gamma\alpha-\mathrm{m}(2-\gamma\alpha)]}$, then: $\frac{\beta_D^{\alpha}}{\beta_S^{\alpha}}>(2-\alpha\gamma)$ which is always true since $m^{*}>0$ always holds.

However, when $[\gamma\alpha-\mathrm{m}(2-\gamma\alpha)]<0$, then $\frac{(1-\mathrm{m})}{[\gamma\alpha-\mathrm{m}(2-\gamma\alpha)]}<0<1$ meaning that:

$\frac{(2-\gamma\alpha)(1-\mathrm{m})}{[\gamma\alpha-\mathrm{m}(2-\gamma\alpha)]}<0<(2-\alpha\gamma)$.

So, condition $\frac{\beta_D^{\alpha}}{\beta_S^{\alpha}}>\frac{(2-\gamma\alpha)(1-m)}{[\gamma\alpha-m(2-\gamma\alpha)]}$ is always true since we have:

$\frac{(2-\gamma\alpha)(1-m)}{[\gamma\alpha-m(2-\gamma\alpha)]}<0<\frac{\beta_D^{\alpha}}{\beta_S^{\alpha}}$.

So, the results depend on whether $[\gamma\alpha-m(2-\gamma\alpha)]$ is positive or negative. The necessary condition to have $[\gamma\alpha-m(2-\gamma\alpha)]>0$ is $m<\frac{\gamma\alpha}{(2-\gamma\alpha)}$ since $(2-\gamma\alpha)>0$.

Demo 3: Optimal emigration rate under risk neutrality

$$H_{RN}=(1-m)N\left[\frac{c}{\gamma a\left[m\left(\beta_D-\beta_S\right)+\beta_S\right]}\right]^{\frac{1}{\gamma-1}}$$

$$\frac{\partial H_{RN}}{\partial m}=H_{RN}\left[\frac{\left(\beta_D-\beta_S\right)}{(1-\gamma)\left[m\left(\beta_D-\beta_S\right)+\beta_S\right]}-\frac{1}{(1-m)}\right]$$

When $\frac{\partial H_{RN}}{\partial m}=0$, $\frac{\left(\beta_D-\beta_S\right)}{(1-\gamma)\left[m\left(\beta_D-\beta_S\right)+\beta_S\right]}=\frac{1}{(1-m)}$

So, $m_{RN}^{*}=\frac{\left[\beta_D-(2-\gamma)\beta_S\right]}{(2-\gamma)\left(\beta_D-\beta_S\right)}$

Demo 4: Sign of the first derivative of H/H_0

$$\frac{H}{H_0}=\frac{(1-m)N\left[\dfrac{c}{\gamma a^{\alpha}[m(\beta_D^{\alpha}-\beta_S^{\alpha})+\beta_S^{\alpha}]}\right]^{\frac{1}{\gamma\alpha-1}}}{N\left[\dfrac{c}{\gamma a^{\alpha}\beta_S^{\alpha}}\right]^{\frac{1}{\gamma\alpha-1}}}=(1-m)[m(\beta_D^{\alpha}/\beta_S^{\alpha}-1)+1]^{\frac{1}{1-\gamma\alpha}}$$

$$\frac{\mathrm{H}}{\mathrm{H}_0}=(1-\mathrm{m})\mathrm{u}^{\mathrm{v}}=(1-\mathrm{m})\mathrm{e}^{\mathrm{v}.\ln(\mathrm{u})}$$

$$\frac{\mathrm{d}(\mathrm{e}^{\mathrm{v}\ln(\mathrm{u})})}{\mathrm{d}\alpha}=\mathrm{e}^{\mathrm{v}\ln(\mathrm{u})}\frac{\mathrm{d}(\mathrm{v}\ln(\mathrm{u}))}{\mathrm{d}\alpha}=\mathrm{e}^{\mathrm{v}\ln(\mathrm{u})}\left[\frac{\partial \mathrm{v}}{\partial\alpha}\ln(\mathrm{u})+\mathrm{v}\frac{\mathrm{d}\ln(\mathrm{u})}{\mathrm{d}\alpha}\right]=\mathrm{u}^{\mathrm{v}}\ln(\mathrm{u})\frac{\partial \mathrm{v}}{\partial\alpha}+\mathrm{u}^{\mathrm{v}-1}\mathrm{v}\frac{\partial \mathrm{u}}{\partial\alpha}$$

$$\partial(\frac{\mathrm{H}}{\mathrm{H}_0})/\partial\alpha=(1-\mathrm{m})\left\{\frac{1}{1-\gamma\alpha}[\mathrm{m}(\beta_{\mathrm{D}}^{\alpha}/\beta_{\mathrm{S}}^{\alpha}-1)+1]^{\frac{\gamma\alpha}{1-\gamma\alpha}}.\mathrm{m}.\left[\ln\left(\beta_{\mathrm{D}}/\beta_{\mathrm{S}}\right)\right](\beta_{\mathrm{D}}^{\alpha}/\beta_{\mathrm{S}}^{\alpha})+\right.$$

$$\left.+[\mathrm{m}(\beta_{\mathrm{D}}^{\alpha}/\beta_{\mathrm{S}}^{\alpha}-1)+1]^{\frac{1}{1-\gamma\alpha}}\cdot\ln[\mathrm{m}(\beta_{\mathrm{D}}^{\alpha}/\beta_{\mathrm{S}}^{\alpha}-1)+1]\cdot\frac{\gamma}{(1-\gamma\alpha)^2}\right\}$$

$$\partial(\frac{\mathrm{H}}{\mathrm{H}_0})/\partial\alpha=\frac{1-\mathrm{m}}{1-\gamma\alpha}[\mathrm{m}(\beta_{\mathrm{D}}^{\alpha}/\beta_{\mathrm{S}}^{\alpha}-1)+1]^{\frac{\gamma\alpha}{1-\gamma\alpha}}\left\{\mathrm{m}.\left[\ln\left(\beta_{\mathrm{D}}/\beta_{\mathrm{S}}\right)\right](\beta_{\mathrm{D}}^{\alpha}/\beta_{\mathrm{S}}^{\alpha})+\right.$$

$$\left.+[\mathrm{m}(\beta_{\mathrm{D}}^{\alpha}/\beta_{\mathrm{S}}^{\alpha}-1)+1]\cdot\ln[\mathrm{m}(\beta_{\mathrm{D}}^{\alpha}/\beta_{\mathrm{S}}^{\alpha}-1)+1]\cdot\frac{\gamma}{(1-\gamma\alpha)}\right\}$$

For $\alpha>0$, $\left\{\mathrm{m}.\left[\ln\left(\beta_{\mathrm{D}}/\beta_{\mathrm{S}}\right)\right](\beta_{\mathrm{D}}^{\alpha}/\beta_{\mathrm{S}}^{\alpha})\right\}>0$ and $\beta_{\mathrm{D}}^{\alpha}/\beta_{\mathrm{S}}^{\alpha}>1$

So, $[\mathrm{m}(\beta_{\mathrm{D}}^{\alpha}/\beta_{\mathrm{S}}^{\alpha}-1)+1]>1$ and $\left\{\ln[\mathrm{m}(\beta_{\mathrm{D}}^{\alpha}/\beta_{\mathrm{S}}^{\alpha}-1)+1]\right\}>0$

Therefore, the function $\partial(\frac{H}{H_0})/\partial\alpha$ is positive so the function $\frac{H}{H_0}$ is increasing with α.

The second derivative of (H/H_0) as function of α is given by:

$$\partial^2\left(\frac{\mathrm{H}}{\mathrm{H}_0}\right)/\partial\alpha^2=\left\langle\frac{1-\mathrm{m}}{1-\gamma\alpha}[\mathrm{m}(\beta_{\mathrm{D}}^{\alpha}/\beta_{\mathrm{S}}^{\alpha}-1)+1]^{\frac{\gamma\alpha}{1-\gamma\alpha}}\left\{\mathrm{m}.\left[\ln\left(\beta_{\mathrm{D}}/\beta_{\mathrm{S}}\right)\right](\beta_{\mathrm{D}}^{\alpha}/\beta_{\mathrm{S}}^{\alpha})+\right.\right.$$

$$\left.\left.+[\mathrm{m}(\beta_{\mathrm{D}}^{\alpha}/\beta_{\mathrm{S}}^{\alpha}-1)+1]\cdot\ln[\mathrm{m}(\beta_{\mathrm{D}}^{\alpha}/\beta_{\mathrm{S}}^{\alpha}-1)+1]\cdot\frac{\gamma}{(1-\gamma\alpha)}\right\}\right\rangle_{\alpha}'$$

$$\partial^2(H/H_0)/\partial^2\alpha=\partial(ABC)/\partial\alpha=\partial A/\partial\alpha\cdot BC+\partial B/\partial\alpha\cdot AC+\partial C/\partial\alpha\cdot AB$$

$$A=\frac{1-m}{1-\gamma\alpha}$$

$$\partial A/\partial\alpha=\frac{(1-m)\gamma}{(1-\gamma\alpha)^2}$$

$$B=\left[m(\frac{\beta_D^{\alpha}}{\beta_S^{\alpha}}-1)+1\right]^{\frac{\gamma\alpha}{1-\gamma\alpha}}$$

$$\partial B/\partial\alpha = \left[m(\frac{\beta_D^\alpha}{\beta_S^\alpha}-1)+1\right]^{\frac{2\gamma\alpha-1}{1-\gamma\alpha}} \frac{\gamma}{1-\gamma\alpha}\left\{\left[m(\frac{\beta_D^\alpha}{\beta_S^\alpha}-1)+1\right]\ln\left[m(\frac{\beta_D^\alpha}{\beta_S^\alpha}-1)+1\right]\frac{1}{1-\gamma\alpha}+\alpha m\left(\frac{\beta_D}{\beta_S}\right)^\alpha \ln\left(\frac{\beta_D}{\beta_S}\right)\right\}$$

$$C = m\left(\frac{\beta_D}{\beta_S}\right)^\alpha \ln\left(\frac{\beta_D}{\beta_S}\right)+\left[m(\frac{\beta_D^\alpha}{\beta_S^\alpha}-1)+1\right]\ln\left[m(\frac{\beta_D^\alpha}{\beta_S^\alpha}-1)+1\right]\frac{\gamma}{1-\gamma\alpha}$$

$$\partial C/\partial\alpha = m\left(\frac{\beta_D}{\beta_S}\right)^\alpha\left[\ln\left(\frac{\beta_D}{\beta_S}\right)\right]^2+\ln\left[m(\frac{\beta_D^\alpha}{\beta_S^\alpha}-1)+1\right]\frac{\gamma}{1-\gamma\alpha}\left[\frac{\gamma}{1-\gamma\alpha}+m(\frac{\beta_D^\alpha}{\beta_S^\alpha})\ln(\frac{\beta_D}{\beta_S})\right]+\frac{\gamma}{1-\gamma\alpha}m(\frac{\beta_D^\alpha}{\beta_S^\alpha})\ln(\frac{\beta_D}{\beta_S})$$

A, B,C>0 and $\partial A/\partial\alpha>0$, $\partial B/\partial\alpha>0$, $\partial C/\partial\alpha>0$

Then $\partial^2(H/H_0)/\partial^2\alpha>0$

Demo 5: Sign of $\partial m^*/\partial\alpha$

$$m^* = \frac{\left[\beta_D^\alpha-(2-\gamma\alpha)\beta_S^\alpha\right]}{(\beta_D^\alpha-\beta_S^\alpha)(2-\gamma\alpha)}$$

$$\frac{\partial m^*}{\partial\alpha} = \frac{\left[\beta_D^\alpha.\ln(\beta_D)+\gamma\beta_S^\alpha-(2-\gamma\alpha).\ln(\beta_S).\beta_S^\alpha\right](\beta_D^\alpha-\beta_S^\alpha)(2-\gamma\alpha)}{(\beta_D^\alpha-\beta_S^\alpha)^2(2-\gamma\alpha)^2}$$

$$-\frac{\left[\beta_D^\alpha-(2-\gamma\alpha)\beta_S^\alpha\right]\left\{(2-\gamma\alpha)\left[\ln(\beta_D).\beta_D^\alpha-\ln(\beta_S).\beta_S^\alpha\right]-\gamma(\beta_D^\alpha-\beta_S^\alpha)\right\}}{(\beta_D^\alpha-\beta_S^\alpha)^2(2-\gamma\alpha)^2}$$

$$\frac{\partial m^*}{\partial\alpha} = \frac{(2-\gamma\alpha)(\beta_D^\alpha-\beta_S^\alpha)\left\{\beta_D^\alpha.\ln(\beta_D)+\left[\gamma-(2-\gamma\alpha).\ln(\beta_S)\right]\beta_S^\alpha\right\}}{(\beta_D^\alpha-\beta_S^\alpha)^2(2-\gamma\alpha)^2}$$

$$-\frac{\left[\beta_D^\alpha-(2-\gamma\alpha)\beta_S^\alpha\right]\left\{(2-\gamma\alpha)\left[\ln(\beta_D).\beta_D^\alpha-\ln(\beta_S).\beta_S^\alpha\right]-\gamma(\beta_D^\alpha-\beta_S^\alpha)\right\}}{(\beta_D^\alpha-\beta_S^\alpha)^2(2-\gamma\alpha)^2}$$

$$\frac{\partial m^*}{\partial\alpha} = \frac{\beta_D^\alpha\beta_S^\alpha(2-\gamma\alpha)(1-\gamma\alpha)[\ln(\beta_D)-\ln(\beta_S)]+\gamma\beta_D^\alpha(\beta_D^\alpha-\beta_S^\alpha)}{(\beta_D^\alpha-\beta_S^\alpha)^2(2-\gamma\alpha)^2}$$

So $\frac{\partial m^*}{\partial\alpha}>0$ for $\alpha\in]0,1]$.

Appendix II: Calculations and tests related to the validation of the model

ECE Countries

Bulgaria

Years	m	Relative wage	H/H0 Theoretical gamma 0.43	H/H0 Theoretical gamma 0.75	H/H0 Observed
1991	1.3%	12.76	1.30055145	1.73243252	
1992	1.3%	12.76	1.30467736	1.74396915	
1993	1.3%	12.76	1.30060633	1.7325857	
1994	1.3%	12.76	1.30143016	1.73488613	
1995	1.3%	12.76	1.30968771	1.7580334	
1996	1.3%	12.76	1.30803936	1.75339979	
1997	1.4%	12.76	1.32564367	1.8032222	1.11
1998	1.4%	12.76	1.32170581	1.79201323	1.11
1999	1.4%	12.76	1.33580341	1.83231298	1.11
2000	1.5%	12.76	1.3629798	1.91134458	1.07
2001	1.5%	12.76	1.36506992	1.91749628	1.04
2002	1.6%	12.76	1.39142771	1.9959757	1.04
2003	1.9%	12.76	1.45635137	2.19643966	1.03
2004	2.0%	12.76	1.48330395	2.28266425	1.03
mean			1.34766271	1.87048397	1.06593392
st dev			0.05909255	0.17688049	0.037368131
p-value			3.9464E-08	1.3154E-06	
t test			7.66085045	6.24420149	

Years	m	Relative wage	H/H0 Theoretical alpha 0.33	H/H0 Theoretical alpha 0.5	H/H0 Theoretical alpha 0.75	H/H0 Observed
1991	1.3%	12.76	1.00710488	1.03056691	1.104848173	
1992	1.3%	12.76	1.00719413	1.03095932	1.106221077	
1993	1.3%	12.76	1.00710607	1.03057213	1.104866445	
1994	1.3%	12.76	1.0071239	1.03065054	1.105140702	
1995	1.3%	12.76	1.00730224	1.03143496	1.107886139	
1996	1.3%	12.76	1.00726671	1.03127859	1.107338609	
1997	1.4%	12.76	1.00764462	1.03294339	1.113173218	1.11
1998	1.4%	12.76	1.00756039	1.032572	1.111870567	1.11
1999	1.4%	12.76	1.00786111	1.0338989	1.116527552	1.11
2000	1.5%	12.76	1.00843452	1.03643621	1.125454536	1.07
2001	1.5%	12.76	1.00847828	1.03663024	1.126138395	1.04
2002	1.6%	12.76	1.0090261	1.0390639	1.134729753	1.04
2003	1.9%	12.76	1.01034436	1.04495675	1.155642262	1.03
2004	2.0%	12.76	1.01087913	1.04736231	1.164223714	1.03
mean			1.00809475	1.03495187	1.120290082	1.065934
st dev			0.00122509	0.005446	0.019236172	0.037368
p-value			0.00344642	0.07299119	0.003867595	

t test			3.21788138	1.86856175	3.171343075	

Czech Republic

Years	m	Relative wage	H/H0 Theoretical	H/H0 Theoretical gamma 0.75	(gamma 0.43)
1991	2.6%	4.24	2.65305163	1.342435	
1992	2.6%	4.24	2.68809996	1.34774479	1.000873024
1993	2.5%	4.24	2.58178398	1.33148324	1.039250134
1994	2.4%	4.24	2.49351968	1.3176195	1.07688715
1995	2.3%	4.24	2.42854834	1.30719129	1.113482286
1996	2.3%	4.24	2.41969616	1.30575528	1.111757795
1997	6.9%	4.24	11.7270194	2.09369539	1.147602419
1998	2.3%	4.24	2.40611865	1.30354549	1.109591403
1999	2.3%	4.24	2.35824221	1.29568246	1.137181366
2000	2.1%	4.24	2.21520715	1.27149852	1.254898453
2001	2.2%	4.24	2.27379956	1.28153472	1.261372497
2002	1.9%	4.24	2.1019099	1.2515477	1.28271593
2003	2.1%	4.24	2.22840887	1.27377603	1.282841674
2004	2.6%	4.24	2.70320489	1.3500181	1.282841674
mean			3.09132931	1.36239482	1.161638139
st dev			2.49236225	0.21260965	0.099583659
p-value			0.01821113	0.00807396	
t test			2.5200393	2.86876341	

Years	m	Relative wage	H/H0 Theoretical alpha 0.33	H/H0 Theoretical alpha 0.5	H/H0 Theoretical alpha 0.75	(gamma 0.43)
1991	2.6%	4.24	0.99632639	1.02402862	1.141508985	
1992	2.6%	4.24	0.99626763	1.02435502	1.143562058	1.000873
1993	2.5%	4.24	0.99644745	1.02335162	1.137262529	1.03925
1994	2.4%	4.24	0.99660045	1.02248721	1.131863776	1.076887
1995	2.3%	4.24	0.99671534	1.02183146	1.127785567	1.113482
1996	2.3%	4.24	0.99673115	1.02174078	1.127222804	1.111758
1997	6.9%	4.24	0.98777122	1.06118566	1.402477203	1.147602
1998	2.3%	4.24	0.99675546	1.02160107	1.126356245	1.109591
1999	2.3%	4.24	0.99684193	1.02110214	1.123267269	1.137181
2000	2.1%	4.24	0.99710725	1.01955001	1.113711961	1.254898
2001	2.2%	4.24	0.99699726	1.0201974	1.117687467	1.261372
2002	1.9%	4.24	0.99732537	1.01824906	1.105765779	1.282716
2003	2.1%	4.24	0.9970823	1.01969733	1.114615388	1.282842
2004	2.6%	4.24	0.99624246	1.02449439	1.14443991	1.282842
mean			0.99608655	1.02456227	1.14696621	1.161638
st dev			0.00241597	0.01071029	0.074476178	0.099584
p-value			6.2529E-05	0.00032307	0.687666401	
t test			4.76479466	4.14137824	0.406549042	

Hungary

Years	m	Relative wage	H/H0 Theoretical	H/H0 Theoretical gamma 0.75	H/H0 Observed
1991	2.4%	4.13	1.09728874	1.30516544	
1992	2.4%	4.13	1.09852981	1.30944145	
1993	2.5%	4.13	1.10011561	1.3149199	
1994	2.5%	4.13	1.09973001	1.31358625	
1995	2.5%	4.13	1.10220254	1.32215483	
1996	2.5%	4.13	1.10129153	1.31899305	1.007422948
1997	2.4%	4.13	1.09895988	1.31092556	1.025857855
1998	2.5%	4.13	1.10113979	1.31846693	1.021716036
1999	2.4%	4.13	1.09849191	1.30931072	1.036473156
2000	2.6%	4.13	1.10466223	1.33071897	
2001	2.7%	4.13	1.10722902	1.33969871	
2002	2.6%	4.13	1.10416335	1.32897872	1.026261935
2003	2.7%	4.13	1.10857627	1.34442946	1.023130316
2004	3.1%	4.13	1.12668322	1.40919263	1.023130316
mean			1.10350456	1.3268559	1.018221396
st dev			0.00747149	0.02642949	0.012733543
p-value			8.6384E-11	1.7713E-11	
t test			10.4368837	11.2372025	

Years	m	Relative wage	H/H0 Theoretical alpha 0.33	H/H0 Theoretical alpha 0.5	H/H0 Theoretical alpha 0.75	H/H0 Observed
1991	2.4%	4.13	0.99197208	1.00595557	1.038841503	
1992	2.4%	4.13	0.99186442	1.00602329	1.039325672	
1993	2.5%	4.13	0.99172665	1.00610953	1.039943919	
1994	2.5%	4.13	0.99176017	1.00608859	1.039793629	
1995	2.5%	4.13	0.99154502	1.00622249	1.040756838	
1996	2.5%	4.13	0.99162436	1.00617325	1.040402073	1.007423
1997	2.4%	4.13	0.99182708	1.00604671	1.039493385	1.025858
1998	2.5%	4.13	0.99163756	1.00616504	1.040342966	1.021716
1999	2.4%	4.13	0.99186771	1.00602123	1.039310891	1.036473
2000	2.6%	4.13	0.99133044	1.00635488	1.041713942	
2001	2.7%	4.13	0.99110595	1.00649216	1.042711543	
2002	2.6%	4.13	0.99137401	1.00632809	1.041519907	1.026262
2003	2.7%	4.13	0.99098789	1.00656385	1.04323468	1.02313
2004	3.1%	4.13	0.98938535	1.00750356	1.050233615	1.02313
mean			0.99142919	1.00628916	1.041258897	1.018221
st dev			0.00065733	0.00039376	0.002896004	0.012734
p-value			0.00021501	0.02379024	0.001324509	
t test			4.29651543	2.40113562	3.597051231	

Lithuania

Years	m	Relative wage	H/H0 Theoretical gamma	H/H0 Theoretical gamma 0.75	H/H0 Observed
1991	0.1%	5.42	1.03607732	1.02392669	
1992	0.2%	5.42	1.04369232	1.02894086	1.004829342
1993	0.2%	5.42	1.05299993	1.03505282	1.012842534
1994	0.2%	5.42	1.05711909	1.03775189	1.034672489
1995	0.2%	5.42	1.05968257	1.03942981	1.019709689
1996	0.3%	5.42	1.07235077	1.04770177	1.021650361
1997	0.3%	5.42	1.08748878	1.05754333	1.021669097
1998	0.4%	5.42	1.10949851	1.0717703	1.012568242
1999	0.5%	5.42	1.14039603	1.09158261	1.013383052
2000	0.6%	5.42	1.15253845	1.0993189	
2001	0.6%	5.42	1.16702941	1.10851559	
2002	0.8%	5.42	1.20712675	1.13376464	
2003	0.9%	5.42	1.25303384	1.16232666	
2004	1.2%	5.42	1.33079941	1.2099163	
mean			1.12641666	1.0819673	1.017665601
st dev			0.08823934	0.05590544	0.008925674
p-value			0.00104751	0.00242903	
t test			3.68856629	3.35790653	

Years	m	Relative wage	H/H0 Theoretical alpha 0.33	H/H0 Theoretical alpha 0.5	H/H0 Theoretical alpha 0.75	H/H0 Observed
1991	0.1%	5.42	1.00003858	1.00180428	1.008208968	
1992	0.2%	5.42	1.00004613	1.00217795	1.009915615	1.004829
1993	0.2%	5.42	1.0000551	1.00263139	1.011989625	1.012843
1994	0.2%	5.42	1.00005897	1.00283093	1.012903337	1.034672
1995	0.2%	5.42	1.00006136	1.00295475	1.013470691	1.01971
1996	0.3%	5.42	1.00007282	1.00356279	1.01626021	1.02165
1997	0.3%	5.42	1.00008584	1.00428102	1.019563028	1.021669
1998	0.4%	5.42	1.00010352	1.00530953	1.024307324	1.012568
1999	0.5%	5.42	1.00012594	1.00672304	1.030855851	1.013383
2000	0.6%	5.42	1.00013401	1.00726918	1.033394852	
2001	0.6%	5.42	1.00014312	1.00791427	1.036400179	
2002	0.8%	5.42	1.00016551	1.00966264	1.044580172	
2003	0.9%	5.42	1.00018635	1.01160161	1.053711655	
2004	1.2%	5.42	1.00021112	1.01474541	1.068652074	
mean			1.00010631	1.00596206	1.027443827	1.017666
st dev			5.5501E-05	0.00391546	0.018247841	0.008926
p-value			0.0008386	0.00301138	0.950127524	
t test			3.77489304	3.27209313	0.063153211	

Poland

Years	m	Relative wage	H/H0 Theoretical gamma	H/H0 Theoretical gamma 0.75	H/H0 Observed
1991	2.1%	6.08	2.0133583	1.46608328	
1992	2.1%	6.08	2.0207881	1.469034	1.003145559
1993	2.1%	6.08	2.04748695	1.47959651	1.005611279
1994	1.8%	6.08	1.83833045	1.39506345	1.053633521
1995	2.1%	6.08	2.03896501	1.47623199	1.054836311
1996	2.1%	6.08	2.00582935	1.46308808	1.10156591
1997	2.1%	6.08	2.0098214	1.46467685	1.102478699
1998	2.2%	6.08	2.07974328	1.49227368	1.056983566
1999	2.3%	6.08	2.12089302	1.50831582	1.039615981
2000	2.3%	6.08	2.18518471	1.53309651	1.010005184
2001	2.4%	6.08	2.21895291	1.54597807	1.000172574
2002	2.4%	6.08	2.20996808	1.54255947	1.045115577
2003	2.6%	6.08	2.36912781	1.60220514	1.044131476
2004	3.1%	6.08	2.79449552	1.7531445	1.044131476
mean			2.13949606	1.51366767	1.043186701
st dev			0.22752788	0.08493193	0.033346121
p-value			5.6714E-10	6.9877E-12	
t test			9.53408487	11.7255316	

Years	m	Relative wage	H/H0 Theoretical alpha 0.33	H/H0 Theoretical alpha 0.5	H/H0 Theoretical alpha 0.75	H/H0 Observed
1991	2.1%	6.08	1.00244229	1.03233628	1.153861689	
1992	2.1%	6.08	1.00245349	1.03251264	1.154746144	1.003146
1993	2.1%	6.08	1.00249323	1.0331416	1.157904558	1.005611
1994	1.8%	6.08	1.00215962	1.02800215	1.132285197	1.053634
1995	2.1%	6.08	1.00248063	1.03294165	1.156899784	1.054836
1996	2.1%	6.08	1.00243088	1.03215696	1.152962945	1.101566
1997	2.1%	6.08	1.00243694	1.03225212	1.153439795	1.102479
1998	2.2%	6.08	1.00254023	1.0338917	1.161679732	1.056984
1999	2.3%	6.08	1.00259863	1.03483351	1.166432944	1.039616
2000	2.3%	6.08	1.00268653	1.0362725	1.173723567	1.010005
2001	2.4%	6.08	1.00273114	1.03701306	1.177489012	1.000173
2002	2.4%	6.08	1.00271938	1.03681701	1.176491318	1.045116
2003	2.6%	6.08	1.00291754	1.04018793	1.193735613	1.044131
2004	3.1%	6.08	1.00335657	1.04828241	1.235928641	1.044131
mean			1.00260336	1.03504582	1.167684353	1.043187
st dev			0.00028239	0.00479674	0.024537069	0.033346
p-value			0.00088571	0.41209081	2.32827E-10	
t test			3.75371604	0.83361568	9.955075744	

Romania

Years	m	Relative wage	H/H0 Theoretical	H/H0 Theoretical gamma 0.75	H/H0 Observed
1991	2.1%	10.38	1.80432802	1.98965289	
1992	2.1%	10.38	1.83920962	2.0345851	
1993	2.5%	10.38	2.01253089	2.25993396	
1994	2.6%	10.38	2.0538929	2.31420799	
1995	2.6%	10.38	2.04425445	2.3015441	
1996	2.6%	10.38	2.06751449	2.3321224	1.02
1997	2.7%	10.38	2.10542668	2.38208703	1.01
1998	2.7%	10.38	2.12180518	2.40371947	1.04
1999	2.7%	10.38	2.11384399	2.39320093	1.08
2000	2.8%	10.38	2.1729532	2.4714555	1.07
2001	2.9%	10.38	2.2335956	2.55211401	1.07
2002	3.1%	10.38	2.34973444	2.70761437	1.07
2003	3.4%	10.38	2.48386417	2.88882356	1.07
2004	3.5%	10.38	2.58556685	3.0273369	1.07
mean			2.14203718	2.43274273	1.053813883
st dev			0.21732536	0.28875535	0.023474935
p-value			3.7321E-08	6.5715E-08	
t test			7.68425248	7.44854462	

Years	m	Relative wage	H/H0 Theoretical alpha 0.33	H/H0 Theoretical alpha 0.5	H/H0 Theoretical alpha 0.75	H/H0 Observed
1991	2.1%	10.38	1.01022685	1.04993432	1.198143098	
1992	2.1%	10.38	1.01057139	1.051691	1.205468275	
1993	2.5%	10.38	1.01220094	1.06007395	1.240762317	
1994	2.6%	10.38	1.01257103	1.06199547	1.248931372	
1995	2.6%	10.38	1.0124854	1.06155027	1.247036031	
1996	2.6%	10.38	1.01269143	1.06262204	1.25160153	1.02
1997	2.7%	10.38	1.01302279	1.06435007	1.258981955	1.01
1998	2.7%	10.38	1.01316426	1.06508951	1.262147447	1.04
1999	2.7%	10.38	1.01309562	1.06473062	1.260610486	1.08
2000	2.8%	10.38	1.01359972	1.06737194	1.271946091	1.07
2001	2.9%	10.38	1.01410404	1.07002728	1.283398491	1.07
2002	3.1%	10.38	1.01503571	1.07496756	1.304857604	1.07
2003	3.4%	10.38	1.01606011	1.0804534	1.328918914	1.07
2004	3.5%	10.38	1.01680307	1.08446854	1.346685452	1.07
mean			1.01325945	1.06566614	1.264963504	1.053814
st dev			0.00182747	0.00959698	0.04128595	0.023475
p-value			0.00095914	0.07195649	8.46824E-11	
t test			3.72281865	1.87578117	10.44669405	

Slovakia

Years	m	Relative wage	H/H0 Theoretical gamma	H/H0 Theoretical gamma 0.75	H/H0 Observed
1991	2.58%	6.45	1.46873477	1.64763385	
1992	2.7%	6.45	1.4892406	1.67761783	
1993	2.6%	6.45	1.4697677	1.64914115	
1994	2.6%	6.45	1.47301471	1.65388147	
1995	2.8%	6.45	1.51564259	1.71641074	
1996	3.2%	6.45	1.60724349	1.85260619	
1997	12.9%	6.45	4.6149567	7.36183927	
1998	2.9%	6.45	1.53038935	1.73816948	
1999	2.2%	6.45	1.40069843	1.54907753	1.15
2000	2.2%	6.45	1.40302605	1.55242543	1.18
2001	2.3%	6.45	1.40953196	1.56179214	1.14
2002	1.7%	6.45	1.30212844	1.40889314	1.29
2003	2.1%	6.45	1.37338221	1.50991585	1.39
2004	2.3%	6.45	1.41819467	1.57428468	1.64
mean			1.67685369	2.03240634	1.298359092
st dev			0.84897248	1.53780104	0.193389725
p-value			0.33146386	0.03335169	
t test			0.98965542	2.24698933	

Years	m	Relative wage	H/H0 Theoretical alpha 0.33	H/H0 Theoretical alpha 0.5	H/H0 Theoretical alpha 0.75	H/H0 Observed
1991	2.6%	6.45	1.001828	1.03337717	1.136683892	
1992	2.7%	6.45	1.001873	1.03463308	1.142071873	
1993	2.6%	6.45	1.00183032	1.03344076	1.13695628	
1994	2.6%	6.45	1.00183758	1.03364045	1.137811848	
1995	2.8%	6.45	1.00192756	1.03622995	1.148949564	
1996	3.2%	6.45	1.00208884	1.04160296	1.17231558	
1997	12.9%	6.45	0.99596576	1.14649776	1.715733663	
1998	2.9%	6.45	1.00195641	1.03711222	1.152762524	
1999	2.2%	6.45	1.00166139	1.02910768	1.118505644	1.15
2000	2.2%	6.45	1.00166754	1.02925644	1.119135442	1.18
2001	2.3%	6.45	1.00168457	1.02967119	1.120892749	1.14
2002	1.7%	6.45	1.00136892	1.02262105	1.091289199	1.29
2003	2.1%	6.45	1.00158665	1.02734714	1.111071301	1.39
2004	2.3%	6.45	1.00170685	1.03022109	1.123225746	1.64
mean			1.00135596	1.04033992	1.173386093	1.298359
st dev			0.00156157	0.03090919	0.157366412	0.19339
p-value			0.05439614	0.58187444	0.212921992	
t test			2.01462061	0.5576188	1.276906321	

MENA Countries

Risk Neutral Model

Country	Years	m	Relative wage	H/H0 Theoretical gamma 0.73	H/H0 Theoretical gamma 0.25	H/H0 Observed
Algeria	1991	0.0094	3.14	1.0666	1.0173	
	1992	0.0099	3.14	1.0702	1.0182	
	1993	0.0104	3.14	1.0736	1.0191	
	1994	0.0103	3.14	1.0728	1.0189	
	1995	0.0105	3.14	1.0746	1.0193	1.0286
	1996	0.0097	3.14	1.0689	1.0179	1.1511
	1997	0.0097	3.14	1.0686	1.0178	1.2208
	1998	0.0160	3.14	1.1147	1.0292	1.2785
	1999	0.0222	3.14	1.1608	1.0401	1.2977
	2000	0.0281	3.14	1.2066	1.0506	1.3166
	2001	0.0337	3.14	1.2509	1.0604	1.3361
	2002	0.0390	3.14	1.2931	1.0694	1.3571
	2003	0.0405	3.14	1.3057	1.0720	1.3793
	2004	0.0418	3.14	1.3157	1.0741	1.3793
	Mean			1.1531	1.0374	1.2745
	Stand.dev.			0.1003	0.0230	0.1123
	t-stat (theoretical and observed H/H0)			-2.7295	-6.5780	
Egypt	1991	0.0901	3.68	2.0254	1.2136	
	1992	0.0798	3.68	1.8843	1.1911	
	1993	0.0719	3.68	1.7803	1.1734	
	1994	0.0565	3.68	1.5888	1.1382	
	1995	0.0554	3.68	1.5760	1.1358	
	1996	0.0527	3.68	1.5439	1.1294	
	1997	0.0640	3.68	1.6805	1.1555	
	1998	0.0619	3.68	1.6543	1.1507	
	1999	0.0567	3.68	1.5917	1.1388	1.0485
	2000	0.0544	3.68	1.5639	1.1334	1.1316
	2001	0.0552	3.68	1.5741	1.1354	1.1529
	2002	0.0554	3.68	1.5767	1.1359	1.1740
	2003	0.0552	3.68	1.5735	1.1353	1.1950
	2004	0.0562	3.68	1.5853	1.1376	1.1950
	Mean			1.6570	1.1503	1.1495
	Stand.dev.			0.1429	0.0252	0.0553
	t-stat (theoretical and observed H/H0)			11.4420	0.0327	
Jordan	1991	0.0796	2.38	1.3554	1.0580	
	1992	0.0838	2.38	1.3755	1.0605	
	1993	0.0826	2.38	1.3696	1.0598	
	1994	0.0795	2.38	1.3546	1.0579	
	1995	0.0828	2.38	1.3706	1.0599	1.0330
	1996	0.0850	2.38	1.3812	1.0612	1.0651

	1997	0.0872	2.38	1.3920	1.0625	1.1214
	1998	0.0862	2.38	1.3871	1.0619	1.2537
	1999	0.0806	2.38	1.3600	1.0586	1.4361
	2000	0.0824	2.38	1.3687	1.0597	1.4807
	2001	0.0858	2.38	1.3850	1.0617	1.5622
	2002	0.0880	2.38	1.3958	1.0630	1.6058
	2003	0.0921	2.38	1.4156	1.0653	1.6482
	2004	0.0983	2.38	1.4460	1.0688	1.6482
	Mean			1.3826	1.0614	1.3854
	Stand.dev.			0.0248	0.0030	0.2457
	t-stat (theoretical and observed H/H0)			-0.0357	-4.1703	
Libya	1991	0.0559	3.13	1.4322	1.0969	
	1992	0.0569	3.13	1.4413	1.0986	1.1048
	1993	0.0583	3.13	1.4529	1.1008	1.2478
	1994	0.0650	3.13	1.5122	1.1116	1.1915
	1995	0.0711	3.13	1.5663	1.1211	1.1701
	1996	0.0784	3.13	1.6336	1.1325	1.1933
	1997	0.0868	3.13	1.7122	1.1451	1.2075
	1998	0.0950	3.13	1.7916	1.1572	1.2312
	1999	0.1012	3.13	1.8526	1.1661	1.2554
	2000	0.1059	3.13	1.8993	1.1727	1.2799
	2001	0.1148	3.13	1.9905	1.1851	1.3053
	2002	0.1201	3.13	2.0462	1.1923	1.3315
	2003	0.1253	3.13	2.1011	1.1992	1.3587
	2004	0.1315	3.13	2.1685	1.2073	1.3587
	Mean			1.7572	1.1490	1.2489
	Stand.dev.			0.2584	0.0393	0.0766
	t-stat (theoretical and observed H/H0)			7.0356	-4.2113	
Morocco	1991	0.0862	3.05	1.6673	1.1347	
	1992	0.0874	3.05	1.6776	1.1363	
	1993	0.0826	3.05	1.6353	1.1296	
	1994	0.0511	3.05	1.3710	1.0833	
	1995	0.0477	3.05	1.3441	1.0781	
	1996	0.0479	3.05	1.3455	1.0784	
	1997	0.0423	3.05	1.3024	1.0698	
	1998	0.0442	3.05	1.3168	1.0727	1.0170
	1999	0.0461	3.05	1.3314	1.0756	1.0340
	2000	0.0472	3.05	1.3405	1.0774	1.0511
	2001	0.0471	3.05	1.3399	1.0773	1.1218
	2002	0.0490	3.05	1.3545	1.0801	1.1399
	2003	0.0498	3.05	1.3608	1.0814	1.1581
	2004	0.0511	3.05	1.3710	1.0833	1.1581
	Mean			1.4113	1.0899	1.0971
	Stand.dev.			0.1364	0.0240	0.0611
	t-stat (theoretical and observed H/H0)			7.2820	-0.3038	
Syria	1991	0.1760	2.50	1.9644	1.1265	
	1992	0.1807	2.50	1.9939	1.1285	

	1993	0.1781	2.50	1.9776	1.1274	
	1994	0.1738	2.50	1.9505	1.1256	
	1995	0.1703	2.50	1.9287	1.1241	
	1996	0.1648	2.50	1.8944	1.1216	
	1997	0.1636	2.50	1.8872	1.1211	
	1998	0.1384	2.50	1.7338	1.1083	
	1999	0.1545	2.50	1.8311	1.1167	
	2000	0.1536	2.50	1.8257	1.1163	
	2001	0.1547	2.50	1.8327	1.1168	1.0465
	2002	0.1583	2.50	1.8545	1.1186	1.0722
	2003	0.1615	2.50	1.8745	1.1201	1.0974
	2004	0.1675	2.50	1.9111	1.1228	1.0974
	Mean			1.8900	1.1210	1.0783
	Stand.dev.			0.0715	0.0055	0.0243
	t-stat (theoretical and observed H/H0)			35.8294	3.4817	
Tunisia	1991	0.0390	3.08	1.2832	1.0664	
	1992	0.0326	3.08	1.2336	1.0559	
	1993	0.0328	3.08	1.2349	1.0562	
	1994	0.0376	3.08	1.2720	1.0641	
	1995	0.0317	3.08	1.2272	1.0545	
	1996	0.0267	3.08	1.1890	1.0460	
	1997	0.0298	3.08	1.2128	1.0513	
	1998	0.0298	3.08	1.2122	1.0512	
	1999	0.0312	3.08	1.2234	1.0537	1.0131
	2000	0.0321	3.08	1.2297	1.0550	1.0247
	2001	0.0330	3.08	1.2372	1.0567	1.0365
	2002	0.0345	3.08	1.2483	1.0591	1.0480
	2003	0.0349	3.08	1.2517	1.0598	1.0602
	2004	0.0357	3.08	1.2573	1.0610	1.0602
	Mean			1.2366	1.0565	1.0404
	Stand.dev.			0.0248	0.0053	0.0192
	t-stat (theoretical and observed H/H0)			19.1090	2.0113	
Turkey	1991	0.0368	3.63	1.3556	1.0893	
	1992	0.0371	3.63	1.3594	1.0902	
	1993	0.0377	3.63	1.3650	1.0914	
	1994	0.0345	3.63	1.3321	1.0841	
	1995	0.0346	3.63	1.3326	1.0842	
	1996	0.0560	3.63	1.5694	1.1336	
	1997	0.0295	3.63	1.2797	1.0721	
	1998	0.0326	3.63	1.3115	1.0794	1.0178
	1999	0.0324	3.63	1.3100	1.0791	1.0521
	2000	0.0316	3.63	1.3013	1.0771	1.0941
	2001	0.0319	3.63	1.3039	1.0777	1.1070
	2002	0.0308	3.63	1.2926	1.0751	1.1783
	2003	0.0309	3.63	1.2936	1.0753	1.1967
	2004	0.0311	3.63	1.2960	1.0759	1.1967
	Mean			1.3359	1.0846	1.1204

	Stand.dev.			0.0724	0.0154	0.0719
	t-stat (theoretical and observed H/H0)			6.4576	-1.3011	
Yemen	1991	0.0219	3.17	1.1618	1.0406	
	1992	0.0151	3.17	1.1103	1.0283	
	1993	0.0115	3.17	1.0829	1.0215	
	1994	0.0119	3.17	1.0860	1.0223	
	1995	0.0097	3.17	1.0701	1.0183	
	1996	0.0109	3.17	1.0785	1.0204	
	1997	0.0126	3.17	1.0916	1.0237	
	1998	0.0125	3.17	1.0904	1.0234	
	1999	0.0126	3.17	1.0911	1.0236	
	2000	0.0131	3.17	1.0952	1.0246	
	2001	0.0120	3.17	1.0871	1.0226	1.0514
	2002	0.0134	3.17	1.0974	1.0251	1.0838
	2003	0.0139	3.17	1.1010	1.0260	1.1171
	2004	0.0157	3.17	1.1145	1.0293	1.1171
	Mean			1.0970	1.0250	1.0924
	Stand.dev.			0.0220	0.0054	0.0315
	t-stat (theoretical and observed H/H0)			0.2758	-4.2616	

Risk neutral summary table

Country	Statistics	H/H0 Theoretical gamma 0.73	H/H0 Theoretical gamma 0.25	H/H0 Observed
Algeria	Mean	1.1531	1.0374	1.2745
	Stand.dev.	0.1003	0.0230	0.1123
	t-stat	-2.7295	-6.5780	
	Stand.dev.	0.0329	0.0030	0.2206
	t-stat	-5.5113	-6.1636	
Egypt	Mean	1.6570	1.1503	1.1495
	Stand.dev.	0.1429	0.0252	0.0553
	t-stat	11.4420	0.0327	
	Stand.dev.	1.0354	0.1060	0.0242
	t-stat	5.7173	7.6250	
	Stand.dev.	0.4818	0.0447	0.0502
	t-stat	13.8425	9.6749	
Jordan	Mean	1.3826	1.0614	1.3854
	Stand.dev.	0.0248	0.0030	0.2457
	t-stat	-0.0357	-4.1703	
	Stand.dev.	0.0334	0.0017	0.0221
	t-stat	4.1789	-3.2897	
	Stand.dev.	0.3367	0.0115	0.0074
	t-stat	15.8235	26.9164	
Libya	Mean	1.7572	1.1490	1.2489
	Stand.dev.	0.2584	0.0393	0.0766
	t-stat	7.0356	-4.2113	
Morocco	Mean	1.4113	1.0899	1.0971

	Stand.dev.	0.1364	0.0240	0.0611
	t-stat	7.2820	-0.3038	
	Stand.dev.	0.0238	0.0065	0.6975
	t-stat	-3.5022	-3.7402	
	Stand.dev.	0.0051	0.0003	0.5282
	t-stat	-8.2383	-8.2749	
	Stand.dev.	0.0038	0.0002	0.1361
	t-stat	-5.7748	-6.4037	
Syria	Mean	1.8900	1.1210	1.0783
	Stand.dev.	0.0715	0.0055	0.0243
	t-stat	35.8294	3.4817	
Tunisia	Mean	1.2366	1.0565	1.0404
	Stand.dev.	0.0248	0.0053	0.0192
	t-stat	19.1090	2.0113	
Turkey	Mean	1.3359	1.0846	1.1204
	Stand.dev.	0.0724	0.0154	0.0719
	t-stat	6.4576	-1.3011	
	Stand.dev.	0.0609	0.0037	0.0828
	t-stat	-0.9586	-4.3423	
Yemen	Mean	1.0970	1.0250	1.0924
	Stand.dev.	0.0220	0.0054	0.0315
	t-stat	0.2758	-4.2616	

Risk aversion model

Country	years	M	Relative wage	H/H0 Theoretical alpha=0.33	H/H0 alpha=0.5	H/H0 Theoretical alpha=0.75	H/H0 Observed
Algeria	1991	0.0094	3.14	0.9962	1.0019	1.0188	
	1992	0.0099	3.14	0.9960	1.0020	1.0198	
	1993	0.0104	3.14	0.9958	1.0021	1.0208	
	1994	0.0103	3.14	0.9959	1.0021	1.0205	
	1995	0.0105	3.14	0.9958	1.0022	1.0210	1.0286
	1996	0.0097	3.14	0.9961	1.0020	1.0195	1.1511
	1997	0.0097	3.14	0.9961	1.0020	1.0194	1.2208
	1998	0.0160	3.14	0.9935	1.0032	1.0319	1.2785
	1999	0.0222	3.14	0.9910	1.0043	1.0441	1.2977
	2000	0.0281	3.14	0.9884	1.0053	1.0558	1.3166
	2001	0.0337	3.14	0.9860	1.0062	1.0669	1.3361
	2002	0.0390	3.14	0.9837	1.0070	1.0772	1.3571
	2003	0.0405	3.14	0.9830	1.0072	1.0802	1.3793
	2004	0.0418	3.14	0.9825	1.0073	1.0825	1.3793
	Mean			0.9914	1.0039	1.0413	1.2745
	Stand.dev.			0.0055	0.0022	0.0258	0.1123
	t-stat (theoretical and observed H/H0)			-7.9648	-7.6190	-6.4468	
Egypt	1991	0.0901	3.68	0.9683	1.0311	1.2371	
	1992	0.0798	3.68	0.9725	1.0285	1.2103	
	1993	0.0719	3.68	0.9756	1.0263	1.1897	

	1994	0.0565	3.68	0.9814	1.0216	1.1494	
	1995	0.0554	3.68	0.9818	1.0213	1.1466	
	1996	0.0527	3.68	0.9828	1.0204	1.1395	
	1997	0.0640	3.68	0.9786	1.0240	1.1691	
	1998	0.0619	3.68	0.9794	1.0233	1.1636	
	1999	0.0567	3.68	0.9813	1.0217	1.1501	1.0485
	2000	0.0544	3.68	0.9821	1.0210	1.1440	1.1316
	2001	0.0552	3.68	0.9818	1.0212	1.1462	1.1529
	2002	0.0554	3.68	0.9817	1.0213	1.1468	1.1740
	2003	0.0552	3.68	0.9818	1.0212	1.1461	1.1950
	2004	0.0562	3.68	0.9815	1.0215	1.1487	1.1950
	Mean			0.9793	1.0232	1.1634	1.1495
	Stand.dev.			0.0043	0.0032	0.0292	0.0553
	t-stat (theoretical and observed H/H0)			-7.5338	-5.5960	0.5799	
Jordan	1991	0.0796	2.38	0.9526	0.9839	1.0757	
	1992	0.0838	2.38	0.9499	0.9828	1.0793	
	1993	0.0826	2.38	0.9507	0.9831	1.0783	
	1994	0.0795	2.38	0.9527	0.9840	1.0756	
	1995	0.0828	2.38	0.9506	0.9831	1.0785	1.0330
	1996	0.0850	2.38	0.9492	0.9825	1.0803	1.0651
	1997	0.0872	2.38	0.9478	0.9819	1.0822	1.1214
	1998	0.0862	2.38	0.9484	0.9822	1.0814	1.2537
	1999	0.0806	2.38	0.9520	0.9837	1.0765	1.4361
	2000	0.0824	2.38	0.9508	0.9832	1.0781	1.4807
	2001	0.0858	2.38	0.9487	0.9823	1.0810	1.5622
	2002	0.0880	2.38	0.9473	0.9817	1.0829	1.6058
	2003	0.0921	2.38	0.9447	0.9806	1.0863	1.6482
	2004	0.0983	2.38	0.9407	0.9788	1.0915	1.6482
	Mean			0.9490	0.9824	1.0805	1.3854
	Stand.dev.			0.0033	0.0014	0.0043	0.2457
	t-stat (theoretical and observed H/H0)			-5.6163	-5.1864	-3.9231	
Libya	1991	0.0559	3.13	0.9760	1.0088	1.1092	
	1992	0.0569	3.13	0.9755	1.0089	1.1112	1.1048
	1993	0.0583	3.13	0.9749	1.0091	1.1138	1.2478
	1994	0.0650	3.13	0.9718	1.0097	1.1267	1.1915
	1995	0.0711	3.13	0.9689	1.0102	1.1381	1.1701
	1996	0.0784	3.13	0.9654	1.0107	1.1518	1.1933
	1997	0.0868	3.13	0.9613	1.0111	1.1673	1.2075
	1998	0.0950	3.13	0.9571	1.0113	1.1824	1.2312
	1999	0.1012	3.13	0.9540	1.0115	1.1937	1.2554
	2000	0.1059	3.13	0.9516	1.0115	1.2021	1.2799
	2001	0.1148	3.13	0.9470	1.0114	1.2180	1.3053
	2002	0.1201	3.13	0.9441	1.0113	1.2275	1.3315
	2003	0.1253	3.13	0.9414	1.0111	1.2366	1.3587
	2004	0.1315	3.13	0.9380	1.0109	1.2474	1.3587
	Mean			0.9591	1.0105	1.1733	1.2489
	Stand.dev.			0.0134	0.0010	0.0490	0.0766

	t-stat (theoretical and observed H/H0)			-13.4453	-11.2121	-3.0288	
Morocco	1991	0.0862	3.05	0.9602	1.0079	1.1566	
	1992	0.0874	3.05	0.9596	1.0079	1.1586	
	1993	0.0826	3.05	0.9620	1.0079	1.1503	
	1994	0.0511	3.05	0.9774	1.0064	1.0944	
	1995	0.0477	3.05	0.9790	1.0061	1.0882	
	1996	0.0479	3.05	0.9789	1.0061	1.0886	
	1997	0.0423	3.05	0.9815	1.0057	1.0785	
	1998	0.0442	3.05	0.9806	1.0058	1.0819	1.0170
	1999	0.0461	3.05	0.9797	1.0060	1.0853	1.0340
	2000	0.0472	3.05	0.9792	1.0061	1.0874	1.0511
	2001	0.0471	3.05	0.9792	1.0061	1.0873	1.1218
	2002	0.0490	3.05	0.9784	1.0062	1.0906	1.1399
	2003	0.0498	3.05	0.9780	1.0063	1.0921	1.1581
	2004	0.0511	3.05	0.9774	1.0064	1.0944	1.1581
	Mean			0.9751	1.0065	1.1024	1.0971
	Stand.dev.			0.0079	0.0008	0.0289	0.0611
	t-stat (theoretical and observed H/H0)			-5.2650	-3.9253	0.2179	
Syria	1991	0.1760	2.50	0.8921	0.9607	1.1749	
	1992	0.1807	2.50	0.8889	0.9589	1.1784	
	1993	0.1781	2.50	0.8907	0.9599	1.1765	
	1994	0.1738	2.50	0.8937	0.9615	1.1732	
	1995	0.1703	2.50	0.8961	0.9628	1.1705	
	1996	0.1648	2.50	0.8999	0.9647	1.1661	
	1997	0.1636	2.50	0.9007	0.9651	1.1652	
	1998	0.1384	2.50	0.9176	0.9734	1.1441	
	1999	0.1545	2.50	0.9069	0.9682	1.1577	
	2000	0.1536	2.50	0.9075	0.9685	1.1570	
	2001	0.1547	2.50	0.9067	0.9681	1.1580	1.0465
	2002	0.1583	2.50	0.9043	0.9670	1.1609	1.0722
	2003	0.1615	2.50	0.9021	0.9658	1.1635	1.0974
	2004	0.1675	2.50	0.8980	0.9638	1.1682	1.0974
	Mean			0.9004	0.9649	1.1653	1.0783
	Stand.dev.			0.0079	0.0040	0.0094	0.0243
	t-stat (theoretical and observed H/H0)			-14.4100	-9.2860	6.9975	
Tunisia	1991	0.0390	3.08	0.9833	1.0060	1.0743	
	1992	0.0326	3.08	0.9861	1.0052	1.0622	
	1993	0.0328	3.08	0.9861	1.0052	1.0625	
	1994	0.0376	3.08	0.9839	1.0058	1.0716	
	1995	0.0317	3.08	0.9865	1.0051	1.0606	
	1996	0.0267	3.08	0.9887	1.0044	1.0510	
	1997	0.0298	3.08	0.9873	1.0048	1.0570	
	1998	0.0298	3.08	0.9874	1.0048	1.0569	
	1999	0.0312	3.08	0.9867	1.0050	1.0597	1.0131
	2000	0.0321	3.08	0.9864	1.0051	1.0612	1.0247
	2001	0.0330	3.08	0.9859	1.0052	1.0631	1.0365
	2002	0.0345	3.08	0.9853	1.0054	1.0658	1.0480

	2003	0.0349	3.08	0.9851	1.0055	1.0666	1.0602
	2004	0.0357	3.08	0.9848	1.0056	1.0680	1.0602
	Mean			0.9860	1.0052	1.0629	1.0404
	Stand.dev.			0.0014	0.0004	0.0061	0.0192
	t-stat (theoretical and observed H/H0)			-6.9319	-4.4864	2.8021	
Turkey	1991	0.0368	3.63	0.9880	1.0142	1.0954	
	1992	0.0371	3.63	0.9879	1.0143	1.0963	
	1993	0.0377	3.63	0.9877	1.0145	1.0976	
	1994	0.0345	3.63	0.9888	1.0134	1.0896	
	1995	0.0346	3.63	0.9888	1.0134	1.0897	
	1996	0.0560	3.63	0.9811	1.0204	1.1448	
	1997	0.0295	3.63	0.9905	1.0116	1.0766	
	1998	0.0326	3.63	0.9895	1.0127	1.0845	1.0178
	1999	0.0324	3.63	0.9895	1.0127	1.0842	1.0521
	2000	0.0316	3.63	0.9898	1.0124	1.0820	1.0941
	2001	0.0319	3.63	0.9897	1.0124	1.0827	1.1070
	2002	0.0308	3.63	0.9901	1.0121	1.0798	1.1783
	2003	0.0309	3.63	0.9901	1.0121	1.0801	1.1967
	2004	0.0311	3.63	0.9900	1.0122	1.0807	1.1967
	Mean			0.9887	1.0134	1.0903	1.1204
	Stand.dev.			0.0024	0.0022	0.0170	0.0719
	t-stat (theoretical and observed H/H0)			-4.8420	-3.9317	-1.0915	
Yemen	1991	0.0219	3.17	0.9912	1.0046	1.0445	
	1992	0.0151	3.17	0.9940	1.0033	1.0308	
	1993	0.0115	3.17	0.9955	1.0025	1.0234	
	1994	0.0119	3.17	0.9953	1.0026	1.0242	
	1995	0.0097	3.17	0.9962	1.0022	1.0198	
	1996	0.0109	3.17	0.9957	1.0024	1.0222	
	1997	0.0126	3.17	0.9950	1.0028	1.0258	
	1998	0.0125	3.17	0.9951	1.0027	1.0254	
	1999	0.0126	3.17	0.9950	1.0027	1.0256	
	2000	0.0131	3.17	0.9948	1.0029	1.0267	
	2001	0.0120	3.17	0.9952	1.0026	1.0245	1.0514
	2002	0.0134	3.17	0.9947	1.0029	1.0273	1.0838
	2003	0.0139	3.17	0.9945	1.0030	1.0283	1.1171
	2004	0.0157	3.17	0.9938	1.0034	1.0320	1.1171
	Mean			0.9947	1.0029	1.0272	1.0924
	Stand.dev.			0.0012	0.0006	0.0059	0.0315
	t-stat (theoretical and observed H/H0)			-6.2007	-5.6813	-4.1187	

Risk aversion model summary table

Country	Statistics	H/H0 Theoretical alpha=0.33	H/H0 alpha=0.5	H/H0 Theoretical alpha=0.75	H/H0 Observed
Algeria	Mean	0.9914	1.0039	1.0413	1.2745
	Stand.dev.	0.0055	0.0022	0.0258	0.1123
	t-stat	-7.9648	-7.6190	-6.4468	
	Stand.dev.	0.0086	0.0049	0.0053	0.2206
	t-stat	-6.4092	-6.3323	-6.1161	
Egypt	Mean	0.9793	1.0232	1.1634	1.1495
	Stand.dev.	0.0043	0.0032	0.0292	0.0553
	t-stat	-7.5338	-5.5960	0.5799	
	Stand.dev.	0.0175	0.0015	0.0631	0.0502
	t-stat	-13.6650	-7.2897	10.9278	
Jordan	Mean	0.9490	0.9824	1.0805	1.3854
	Stand.dev.	0.0033	0.0014	0.0043	0.2457
	t-stat	-5.6163	-5.1864	-3.9231	
	Stand.dev.	0.0338	0.0210	0.0291	0.0074
	t-stat	-16.4892	-10.8167	24.0007	
Libya	Mean	0.9591	1.0105	1.1733	1.2489
	Stand.dev.	0.0134	0.0010	0.0490	0.0766
	t-stat	-13.4453	-11.2121	-3.0288	
Morocco	Mean	0.9751	1.0065	1.1024	1.0971
	Stand.dev.	0.0079	0.0008	0.0289	0.0611
	t-stat	-5.2650	-3.9253	0.2179	
	Stand.dev.	0.0016	0.0010	0.0007	0.5282
	t-stat	-8.2898	-8.2850	-8.2720	
	Stand.dev.	0.0012	0.0007	0.0005	0.1361
	t-stat	-6.6596	-6.5773	-6.3540	
Syria	Mean	0.9004	0.9649	1.1653	1.0783
	Stand.dev.	0.0079	0.0040	0.0094	0.0243
	t-stat	-14.4100	-9.2860	6.9975	
Tunisia	Mean	0.9860	1.0052	1.0629	1.0404
	Stand.dev.	0.0014	0.0004	0.0061	0.0192
	t-stat	-6.9319	-4.4864	2.8021	
Turkey	Mean	0.9887	1.0134	1.0903	1.1204
	Stand.dev.	0.0024	0.0022	0.0170	0.0719
	t-stat	-4.8420	-3.9317	-1.0915	
	Stand.dev.	0.0153	0.0093	0.0080	0.0828
	t-stat	-5.5620	-5.1866	-4.0918	
Yemen	Mean	0.9947	1.0029	1.0272	1.0924
	Stand.dev.	0.0012	0.0006	0.0059	0.0315
	t-stat	-6.2007	-5.6813	-4.1187	

Appendices to II.2.

Table II-2-1.1: Projections of the first set of variables

Years	MD Retirement	MD Migration	MD Number	Period MD Addition	Total POP (Millions)	POP density / sq. Km of land	Physician / 10000 people
1999	316	1842	12647		28.5	63.8	4.4
2000	326	1905	13045	2556	28.8	64.6	4.5
2001	358	1998	14314	3501	29.2	65.4	4.9
2002	374	2085	14970	3012	29.5	66.1	5.1
2003	408	2137	16307	3796	29.8	66.8	5.5
2004	419	2197	16775	3012	30.2	67.6	5.6
2005	**801**	**2283**	17188	3029	30.5	68.3	5.6
2006	443	**2356**	17716	3611	30.9	69.1	5.7
2007	457	**2429**	18269	3352	31.2	70.0	5.9
2008	477	**2502**	**19061**	3677	31.6	70.8	6.0
2009	481	**2575**	19250	3168	32.0	71.7	6.0
2010	511	**2648**	**20430**	4236	32.4	72.6	6.3
2011	528	**2721**	**21115**	3843	**32.6**	73.1	6.5
2012	545	**2794**	**21800**	3933	**33.0**	73.9	6.6
2013	562	**2867**	**22484**	4023	**33.4**	74.8	6.7
2014	579	**2940**	**23169**	4114	**33.8**	75.7	6.9
2015	596	**3013**	**23854**	4204	34.3	76.9	7.0
2016	613	**3086**	**24538**	4294	**34.5**	77.4	7.1
2017	631	**3159**	**25223**	4384	**34.9**	78.3	7.2
2018	648	**3232**	**25908**	4474	**35.3**	79.1	7.3
2019	665	**3305**	**26592**	4564	**35.7**	80.0	7.4
2020	682	**3378**	**27277**	4654	36.2	81.1	7.5
2021	699	**3451**	**27962**	4744	**36.5**	81.7	7.7
2022	716	**3524**	**28646**	4835	**36.9**	82.6	7.8
2023	733	**3597**	**29331**	4925	**37.2**	83.5	7.9
2024	750	**3670**	**30016**	5015	**37.6**	84.3	8.0
2025	768	**3743**	**30700**	5105	**38.0**	85.2	8.1
2026	785	**3816**	**31385**	5195	**38.4**	86.1	8.2
2027	802	**3889**	**32070**	5285	**38.8**	86.9	8.3
2028	819	**3962**	**32755**	5375	**39.2**	87.8	8.4
2029	836	**4035**	**33439**	5465	**39.6**	88.6	8.5
2030	853	**4108**	**34124**	5555	**40.0**	89.5	8.5

Table II-2-1.2: Projections of the second set of variables

Years	Urban POP (% of total pop)	Health Expend./ Capita (PPP $)	GDP per Capita (Current US $)	GNI / capita (PPP int. $)	Graduates in Health (000s)
1999	55.3	**160.5**	1380.9	2460.0	**65**
2000	53.3	174.0	1270.3	2510.0	**103**
2001	53.6	199.0	1278.7	2730.0	181
2002	54.0	186.0	1353.6	2840.0	**181**
2003	54.3	218.0	1649.2	3060.0	**220**
2004	54.7	234.0	1863.0	3270.0	**259**
2005	55.0	**243.9**	1924.1	3450.0	251
2006	55.3	**257.8**	2096.1	3790.0	263
2007	55.7	**271.7**	2372.8	3980.0	407
2008	56.0	**285.6**	2768.7	4230.0	444
2009	56.4	**299.5**	2795.2	4400.0	471
2010	58.2	**313.4**	**2852.1**	**4572.0**	**491**
2011	**59.0**	**327.3**	**3011.6**	**4777.6**	**530**
2012	**59.6**	**341.2**	**3171.1**	**4983.3**	**569**
2013	**60.2**	**355.1**	**3330.6**	**5188.9**	**608**
2014	**60.8**	**369.0**	**3490.1**	**5394.5**	**646**
2015	**61.4**	**382.9**	**3649.6**	**5600.2**	**685**
2016	**61.9**	**396.8**	**3809.2**	**5805.8**	**724**
2017	**62.5**	**410.7**	**3968.7**	**6011.5**	**763**
2018	**63.1**	**424.6**	**4128.2**	**6217.1**	**802**
2019	**63.7**	**438.5**	**4287.7**	**6422.7**	**840**
2020	**64.3**	**452.4**	**4447.2**	**6628.4**	**879**
2021	**64.9**	**466.3**	**4606.7**	**6834.0**	**918**
2022	**65.5**	**480.2**	**4766.2**	**7039.6**	**957**
2023	**66.1**	**494.1**	**4925.7**	**7245.3**	**996**
2024	**66.7**	**508.0**	**5085.2**	**7450.9**	**1034**
2025	**67.3**	**521.9**	**5244.7**	**7656.5**	**1073**
2026	**67.9**	**535.8**	**5404.2**	**7862.2**	**1112**
2027	**68.5**	**549.7**	**5563.7**	**8067.8**	**1151**
2028	**69.0**	**563.6**	**5723.2**	**8273.5**	**1190**
2029	**69.6**	**577.5**	**5882.7**	**8479.1**	**1228**
2030	**70.2**	**591.4**	**6042.2**	**8684.7**	**1267**

Table II-2-1.3: Regressions Results for Trends of Key Variables:

Medical Doctor Number :

Statistiques de la régression

Coefficient de détermination R^2	0.967233
Observations	10

	Coefficients	*Erreur-type*	*Statistique t*	*Probabilité*
Constante	12898.52	231.178	55.79484	1.18E-11
MD Number	684.6905	41.9285	16.32996	1.99E-07

Medical Doctor Migrants:

Statistiques de la régression	
Coefficient de détermination R^2	0.9888
Observations	6

	Coefficients	*Erreur-type*	*Statistique t*	*Probabilité*
Constante	1844.76	10.52565	175.26	6E-09
MD Migrants	73.00203	3.476507	20.999	3E-05

Total Population (Millions) :

Statistiques de la régression	
Coefficient de détermination R^2	0.940188
Observations	16

	Coefficients	*Erreur-type*	*Statistique t*	*Probabilité*
Constante	27.60011	0.310167	88.98455	1.12E-20
Total POP	0.385938	0.025081	15.38785	3.63E-10

Urban Population (as % of Total) :

Statistiques de la régression	
Coefficient de détermination R^2	0.899513
Observations	16

	Coefficients	*Erreur-type*	*Statistique t*	*Probabilité*
Constante	51.29743	0.629091	81.54214	3.79E-20
Variable X 1	0.591645	0.050869	11.63066	1.4E-08

Health Expenditures per Capita (PPP $):

Statistiques de la régression	
Coefficient de détermination R^2	0.772873

Observations	5

	Coefficients	*Erreur-type*	*Statistique t*	*Probabilité*
Constante	174.4	8.9073	19.579	0.0003
Health Expend.	13.9	3.63639	3.8225	0.0315

GDP per Capita (Current $) :

Statistiques de la régression	
Coefficient de détermination R^2	0.925783
Observations	12

	Coefficients	*Erreur-type*	*Statistique t*	*Probabilité*
Constante	938.0879	88.10076	10.6479	8.92E-07
GDP per Capita	159.5036	13.56735	11.75643	3.54E-07

GNI per Capita (PPP int. $) :

Statistiques de la régression	
Coefficient de détermination R^2	0.986533
Observations	11

	Coefficients	*Erreur-type*	*Statistique t*	*Probabilité*
Constante	2310	44.91764	51.42746	2E-12
GNI per Capita	205.6364	7.592466	27.08426	6.18E-10

Health Graduates (000s) :

Statistiques de la régression	
Coefficient de détermination R^2	0.801822
Observations	6

	Coefficients	*Erreur-type*	*Statistique t*	*Probabilité*
Constante	64.55167	62.82038	1.027559	0.362232
Health Graduates	38.795	8.419823	4.607579	0.009974

Appendix: II-2-3. A

Figure 1: Gender of respondents

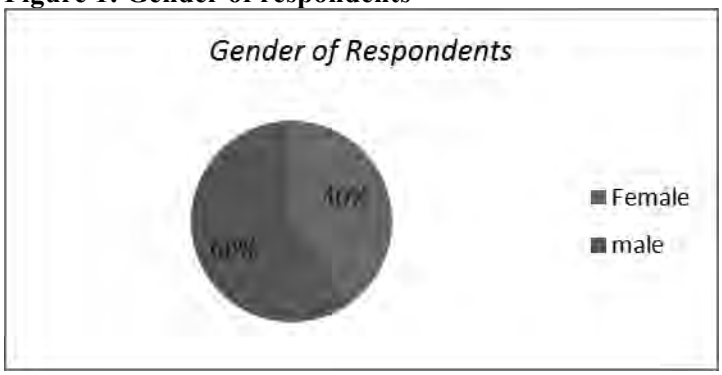


Figure 2: Intention to migrate within males and females

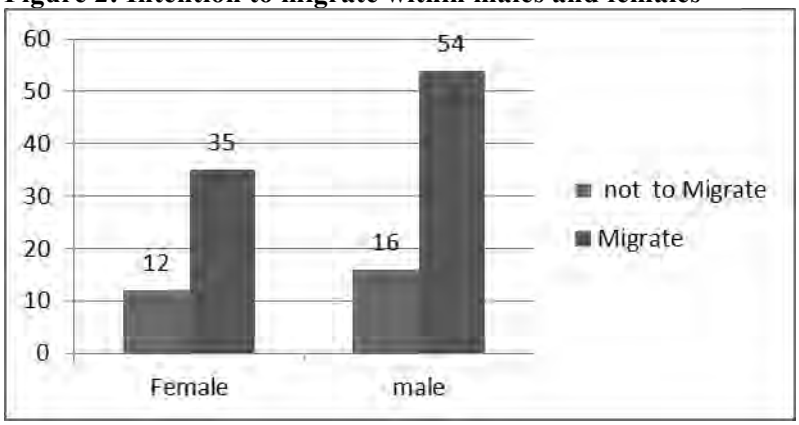


Figure 3: Migration destinations of respondents

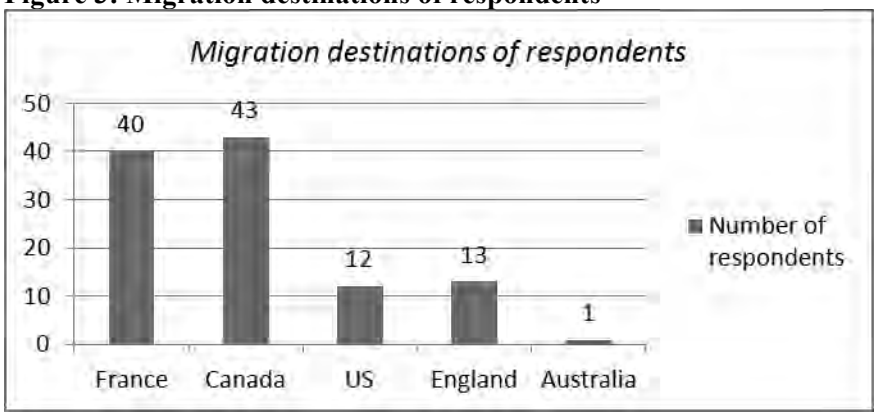


Figure 4: Age distribution within respondents

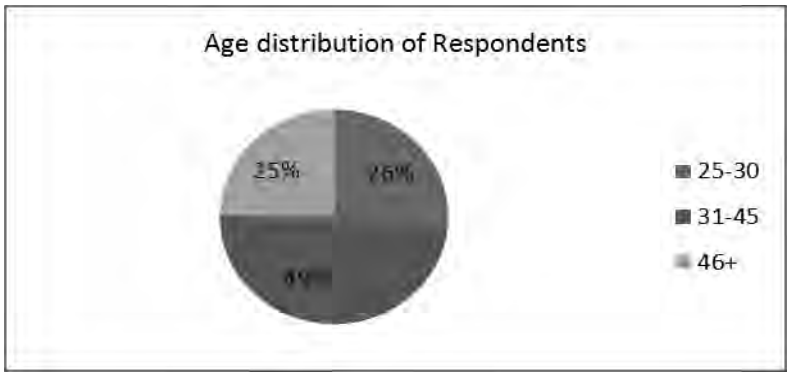


Figure 5: Workplace of respondents

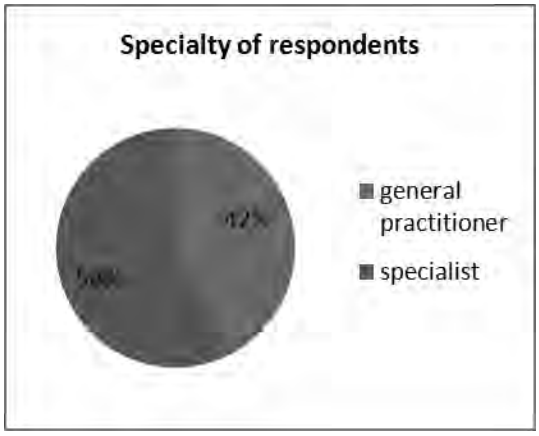


Figure 6: Specialty of respondents

Figure 7: Respondents rating of current salaries

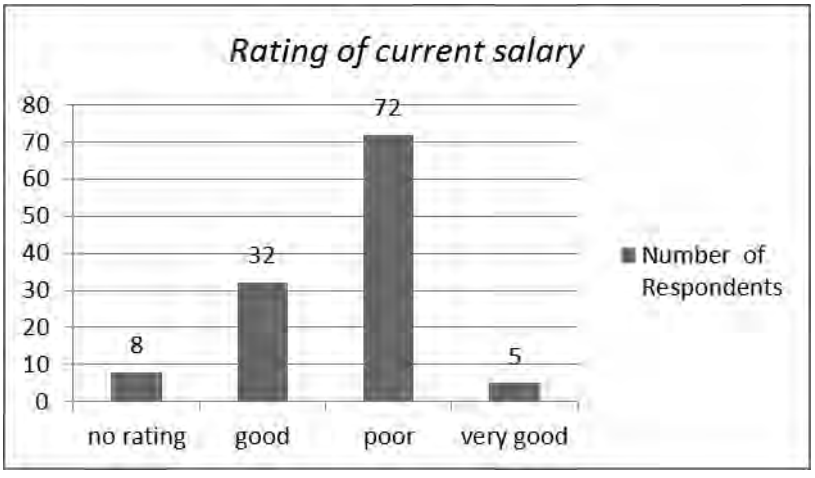


Figure 8: Ratings of current salaries in the public and private hospitals

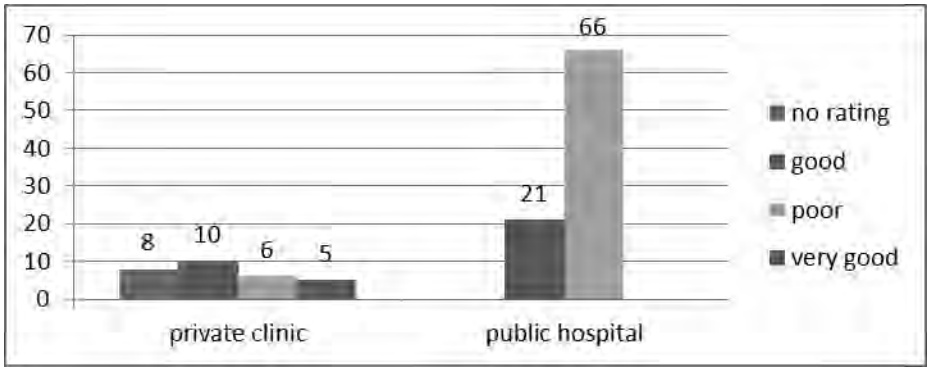


Figure 9: Ratings of salaries relative to medical professionals' specialty

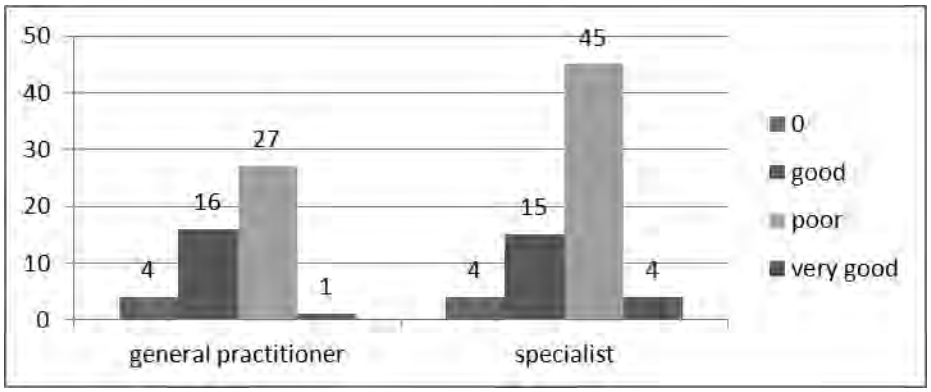


Figure 10: Respondents' desired changes in Moroccan Hospitals

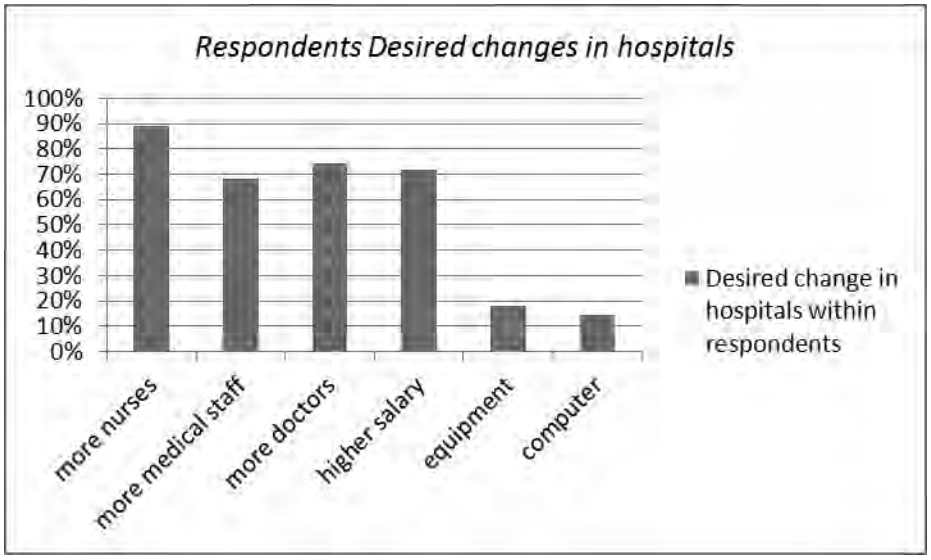
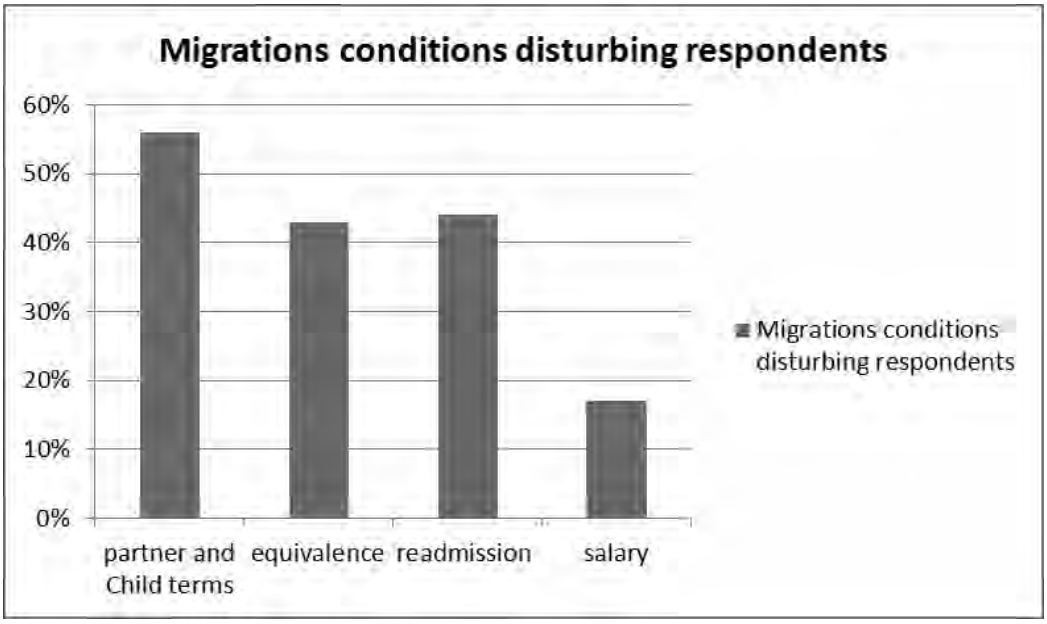


Figure 11: Migration conditions disturbing respondents



Appendix: II-2-3. B: Matrix of answers

From "**Gender**" variable to "**admission documents**" variable

	A	B	C	D	E	F	G
1	Respond	Gend	age	Work place	specialty	origin of degree	Admission documents
2	1	Female	31-45	public hospital	specialist	Morocco	0
3	2	male	31-45	public hospital	specialist	Morocco	0
4	3	male	46+	public hospital	general practitioner	Morocco	0
5	4	male	46+	public hospital	specialist	Morocco	0
6	5	male	31-45	public hospital	specialist	Morocco	0
7	6	Female	31-45	private clinic	specialist	Morocco	long studies
8	7	male	31-45	private clinic	specialist	Algeria	no problems
9	8	male	31-45	public hospital	specialist	Morocco	0
10	9	Female	25-30	public hospital	general practitioner	Morocco	0
11	10	Female	31-45	public hospital	specialist	Morocco	0
12	11	male	31-45	public hospital	specialist	Morocco	0
13	12	Female	31-45	public hospital	general practitioner	Morocco	0
14	13	Female	25-30	public hospital	specialist	Morocco	0
15	14	male	25-30	public hospital	specialist	Morocco	0
16	15	Female	25-30	public hospital	specialist	Morocco	0
17	16	male	31-45	public hospital	specialist	Morocco	0
18	17	male	31-45	public hospital	specialist	Mali	long studies/problems of integration
19	18	Female	31-45	public hospital	specialist	Morocco	0
20	19	male	46+	private clinic	general practitioner	Morocco	0
21	20	male	25-30	public hospital	general practitioner	Morocco	0
22	21	female	31-45	public hospital	general practitioner	Morocco	0
23	22	male	46+	public hospital	general practitioner	Morocco	0
24	23	female	31-45	public hospital	general practitioner	Morocco	0
25	24	female	31-45	public hospital	general practitioner	Morocco	0
26	25	male	46+	public hospital	general practitioner	Morocco	0
27	26	male	46+	public hospital	general practitioner	Morocco	0
28	27	Female	25-30	public hospital	general practitioner	Morocco	0
29	28	male	46+	private clinic	general practitioner	Morocco	0
30	29	Female	31-45	public hospital	specialist	Morocco	0
31	30	male	25-30	private clinic	specialist	Morocco	long studies
32	31	male	31-45	public hospital	general practitioner	Morocco	0
33	32	male	46+	public hospital	specialist	France	no problems
34	33	male	31-45	private clinic	general practitioner	Tunisia	no problems
35	34	male	31-45	public hospital	specialist	Morocco	0
36	35	male	46+	private clinic	specialist	Morocco/France	0
37	36	male	31-45	public hospital	specialist	Morocco	0
38	37	Female	25-30	public hospital	specialist	morocco	equivalence/admission documents
39	38	male	31-45	public hospital	specialist	Morocco	0
40	39	Female	31-45	public hospital	specialist	morocco	0
41	40	male	25-30	public hospital	specialist	morocco	0
42	41	Female	25-30	public hospital	specialist	morocco	equivalence/admission documents
43	42	male	46+	private clinic	general practitioner	morocco	0
44	43	Female	31-45	public hospital	specialist	morocco	0
45	44	male	31-45	private clinic	general practitioner	morocco	0
46	45	male	46+	public hospital	general practitioner	morocco	0
47	46	male	31-45	private clinic	specialist	morocco	0
48	47	Female	25-30	public hospital	specialist	morocco	0
49	48	male	46+	private clinic	specialist	France	too long/admission documents
50	49	Female	25-30	public hospital	general practitioner	morocco	0
51	50	Female	25-30	public hospital	specialist	morocco	0
52	51	Female	25-30	public hospital	general practitioner	morocco	0
53	52	male	25-30	public hospital	general practitioner	MOROCCO	0
54	53	male	31-45	public hospital	specialist	morocco	0
55	54	Female	25-30	public hospital	specialist	MOROCCO	0
56	55	Female	25-30	public hospital	general practitioner	morocco	0
57	56	Female	31-45	public hospital	specialist	morocco	0
58	57	male	31-45	public hospital	specialist	morocco	0
59	58	male	25-30	public hospital	specialist	MOROCCO	0
60	59	male	31-45	public hospital	specialist	morocco	0
61	60	male	31-45	private clinic	specialist	MOROCCO	0
62	61	male	31-45	public hospital	specialist	MOROCCO	0

62	61	male	31-45	public hospital	specialist	MOROCCO	0
63	62	Female	31-45	public hospital	specialist	MOROCCO	0
64	63	male	31-45	public hospital	specialist	MOROCCO	0
65	64	Female	31-45	public hospital	general practitioner	MOROCCO	0
66	65	male	31-45	public hospital	specialist	MOROCCO	0
67	66	Female	31-45	public hospital	specialist	MOROCCO	0
68	67	male	46+	public hospital	general practitioner	morocco	0
69	68	Female	31-45	public hospital	specialist	Morocco	0
70	69	male	31-45	public hospital	specialist	Morocco	0
71	70	male	46+	private clinic	general practitioner	Morocco	0
72	71	male	25-30	public hospital	general practitioner	Morocco	long studies/equivalence
73	72	male	31-45	public hospital	specialist	Morocco	0
74	73	male	25-30	public hospital	specialist	Tunisie	long studies
75	74	Female	25-30	public hospital	general practitioner	Morocco	0
76	75	male	31-45	public hospital	specialist	Morocco	0
77	76	male	31-45	public hospital	specialist	Morocco	0
78	77	Female	25-30	public hospital	general practitioner	Morocco	0
79	78	Female	31-45	public hospital	specialist	France	admission documents
80	79	Female	25-30	public hospital	specialist	Morocco	0
81	80	male	31-45	public hospital	specialist	Morocco	0
82	81	male	31-45	public hospital	specialist	Morocco	0
83	82	Female	25-30	public hospital	specialist	Morocco	0
84	83	male	25-30	public hospital	general practitioner	Morocco	0
85	84	male	25-30	public hospital	general practitioner	Morocco	0
86	85	Female	31-45	public hospital	general practitioner	Morocco	0
87	86	male	31-45	public hospital	general practitioner	Morocco	0
88	87	male	31-45	public hospital	specialist	Morocco	long studies
89	88	Female	25-30	public hospital	general practitioner	Morocco	0
90	89	Female	25-30	private clinic	general practitioner	Morocco	0
91	90	male	31-45	private clinic	general practitioner	tunisie	0
92	91	Female	46+	private clinic	general practitioner	Morocco	0
93	92	Female	25-30	public hospital	general practitioner	Morocco	0
94	93	male	31-45	private clinic	specialist	France	admission documents
95	94	male	46+	public hospital	general practitioner	Morocco	0
96	95	male	46+	private clinic	general practitioner	Morocco	0
97	96	male	46+	private clinic	general practitioner	Morocco	0
98	97	male	46+	private clinic	general practitioner	Morocco	0
99	98	male	31-45	public hospital	general practitioner	Morocco	0
100	99	male	31-45	public hospital	general practitioner	Morocco	0
101	100	Female	46+	private clinic	general practitioner	Morocco	0
102	101	Female	31-45	public hospital	general practitioner	Morocco	equivalence
103	102	Female	31-45	public hospital	general practitioner	Morocco	0
104	103	male	31-45	public hospital	general practitioner	Morocco	0
105	104	Female	46+	public hospital	general practitioner	Morocco	0
106	105	male	46+	private clinic	specialist	France	no problems
107	106	male	46+	private clinic	specialist	USA	equivalence
108	107	Female	25-30	public hospital	specialist	Morocco	0
109	108	Female	25-30	private clinic	general practitioner	Morocco	0
110	109	Female	31-45	public hospital	specialist	Morocco	0
111	110	male	46+	private clinic	specialist	Morocco	0
112	111	male	46+	private clinic	specialist	France	long studies/equivalence/no problems
113	112	male	46+	private clinic	specialist	France	no problems
114	113	Female	46+	private clinic	specialist	Morocco	0
115	114	male	46+	private clinic	specialist	Morocco	0
116	115	male	46+	private clinic	specialist	France	long studies/admission documents
117	116	male	31-45	public hospital	specialist	MOROCCO	0
118	117	Female	31-45	public hospital	specialist	MOROCCO	0

From “**impressions about Moroccan Degree**” variable to “**facilities/problems**” variable

	G	H	I	J
1	impression about abroad degre	impression about Moroccan degree	Application for work abroad	country
2	0	complexity in equivalence	no	0
3	0	complexity in equivalence/selection	no	0
4	0	no problems	no	0
5	0	no problems	no	0
6	0	long studies/complexity in equivalence	no	0
7	long studies	long studies/complexity in equivalence/selection/integration/work opportunities	no	0
8	no problems	long studies/complexity in equivalence/selection/integration/work opportunities	no	0
9	0	long studies/complexity in equivalence/selection/integration	yes	France
10	0	long studies/complexity in equivalence/selection/integration/work opportunities	yes	France
11	0	long studies/complexity in equivalence/selection/integration/work opportunities	no	0
12	0	long studies/complexity in equivalence/selection/integration	yes	France
13	0	selection	no	0
14	0	long studies/complexity in equivalence/selection/integration/work opportunities	no	0
15	0	long studies	no	0
16	0	long studies	no	0
17	0	long studies/equivalence	yes	Luxembourg
18	long studies/problems of integration	no problems	no	0
19	0	long studies/equivalence	no	0
20	0	long studies/no problems	0	0
21	0	long studies/complexity in equivalence/selection/integration	no	0
22	0	long studies/complexity in equivalence/selection/integration	no	0
23	0	selection	no	0
24	0	work opportunities	no	0
25	0	long studies/complexity in equivalence/selection/integration/work opportunities	no	0
26	0	long studies	no	0
27	0	long studies	no	0
28	0	long studies	no	0
29	0	complexity in equivalence/qualification of foreign degrees	no	0
30	0	long studies/equivalence	no	0
31	long studies	complexity in equivalence/selection/integration	no	0
32	0	long studies/equivalence	yes	France
33	no problems	equivalence/no supervising	yes	France
34	no problems	work opportunities	yes	France
35	0	long studies	no	0
36	0	long studies/complexity in equivalence/work opportunities	yes	France
37	0	long studies/complexity in equivalence/work opportunities	yes	Switzerland
38	equivalence/admission documents	studies programs should be changed	yes	France
39	0	long studies	no	0
40	0	long studies/work opportunities	no	0
41	0	long studies/equivalence	yes	France
42	equivalence/admission documents	studies programs should be changed	yes	France
43	0	no problems	no	0
44	0	no problems	no	0
45	0	no problems	no	0
46	0	long studies	yes	France
47	0	complexity in equivalence	0	0
48	0	long studies/equivalence/selection	no	0
49	too long/admission documents	long studies/equivalence	no	0
50	0	long studies/integration	no	0
51	0	long studies/equivalence/selection	no	0
52	0	long studies/equivalence/selection/work opportunities	no	0
53	0	long studies/equivalence/integration	no	0
54	0	equivalence/selection	yes	France
55	0	equivalence/work opportunities	yes	France
56	0	long studies/equivalence	yes	Belgique
57	0	long studies	no	0
58	0	long studies/equivalence/selection/integration	no	0
59	0	long studies	no	0
60	0	no problems	yes	France

61	0	long studies/equivalence/selection/integration	yes	France
62	0	no problems	yes	France
63	0	no problems	no	0
64	0	no problems	yes	France
65	0	long studies/equivalence	yes	France
66	0	Others	no	0
67	0	long studies/equivalence	no	0
68	0	long studies/work opportunities	yes	France
69	0	complexity in equivalence	no	0
70	0	complexity in equivalence/selection	no	0
71	0	no problems	no	0
72	long studies/equivalence	long studies/equivalence/selection/integration/work opportunities	yes	France
73	0	long studies/equivalence/integration	no	0
74	long studies	long studies	no	0
75	0	long studies/equivalence/integration	no	0
76	0	equivalence	no	0
77	0	no problems	no	0
78	0	long studies/equivalence/work opportunities	yes	rance/Belgiqu
79	admission documents	integration	no	0
80	0	long studies/equivalence	yes	rance/Belgiqu
81	0	equivalence/selection	no	0
82	0	long studies/equivalence/work opprtunities	no	0
83	0	equivalence/integration	no	0
84	0	long studies/equivalence/integration/work opprtunities	no	0
85	0	long studies/equivalence/selection/work opportunities	yes	France
86	0	no problems	0	0
87	0	equivalence	no	0
88	long studies	long studies/equivalence	yes	France
89	0	long studies/ equivalence/integration	no	0
90	0	equivalence/integration	no	0
91	0	0	no	0
92	0	integration	no	0
93	0	integration	no	0
94	admission documents	equivalence	yes	France
95	0	long studies/equivalence	no	0
96	0	equivalence	yes	France
97	0	long studies/equivalence	no	0
98	0	long studies	no	0
99	0	integration	no	0
100	0	no problems	no	0
101	0	long studies/equivalence	no	0
102	equivalence	equivalence/work opportunities	no	0
103	0	equivalence	no	0
104	0	long studies/equivalence	yes	France
105	0	long studies/equivalence	no	0
106	no problems	equivalence	no	0
107	equivalence	equivalence	no	0
108	0	long studies/equivalence/selection	no	0
109	0	long studies/integration	no	0
110	0	long studies/integration/equivalence	no	0
111	0	equivalence/no problems	yes	France
112	ong studies/equivalence/no problem	0	no	0
113	no problems	0	no	0
114	0	equivalence/integration/work opportunities	yes	France
115	0	equivalence	yes	aoudite/USA
116	long studies/admission documents	long studies/equivalence	no	0
117	0	long studies/selection	no	0
118	0	long studies/selection	no	0

From "**Facilities/problems**" variable to "**difficulties in treating all patients**" variable (scale)

	K	L	M	N	O
1	facilities/problems	rating of current salary	rating of abroad salaries	rating of equipments in Morocco	difficulties in treating all patient
2	0	poor	good	sufficient	5
3	0	poor	0	insufficient	5
4	0	good	0	insufficient	6
5	0	poor	very good	a huge lack of equipment	0
6	0	poor	0	a huge lack of equipment	0
7	0	very good	0	insufficient	8
8	0	very good	very good	a huge lack of equipment	8
9	problems	poor	very good	a huge lack of equipment	7
10	problems	poor	very good	a huge lack of equipment	6
11	0	poor	0	a huge lack of equipment	7
12	problems	poor	very good	insufficient	5
13	0	poor	0	insufficient	4
14	0	poor	0	sufficient	5
15	0	poor	0	insufficient	7
16	0	poor	0	insufficient	5.5
17	problems	poor	0	insufficient	7
18	problems	poor	very good	insufficient	5
19	0	poor	0	a huge lack of equipment	0
20	0	0	0	a huge lack of equipment	3
21	problems	poor	0	a huge lack of equipment	7
22	0	poor	0	a huge lack of equipment	6
23	0	good	0	a huge lack of equipment	5
24	0	poor	0	insufficient	0
25	0	poor	0	a huge lack of equipment	3
26	0	good	0	insufficient	7
27	0	good	0	insufficient	0
28	0	good	0	insufficient	5
29	0	good	0	a huge lack of equipment	0
30	0	good	0	a huge lack of equipment	5
31	0	0	good	insufficient	0
32	problems	poor	0	insufficient	3
33	facilities	good	very good	insufficient	0
34	facilities	poor	very good	insufficient	0
35	0	good	0	insufficient	0
36	problems	good	good	a huge lack of equipment	0
37	problems	poor	very good	a huge lack of equipment	9
38	facilities	good	very good	a huge lack of equipment	5
39	facilities	good	very good	sufficient	0
40	0	poor	0	a huge lack of equipment	5
41	facilities	poor	very good	a huge lack of equipment	3
42	facilities	good	very good	a huge lack of equipment	5
43	0	very good	meduim	insufficient	5
44	0	poor	0	insufficient	9
45	0	bien	0	insufficient	0
46	problems	good	0	a huge lack of equipment	5
47	0	very good	0	a huge lack of equipment	0
48	0	poor	0	a huge lack of equipment	8
49	0	good	good	insufficient	0
50	0	poor	good	insufficient	3
51	0	poor	0	a huge lack of equipment	8
52	0	poor	0	a huge lack of equipment	3
53	0	poor	very good	insufficient	5
54	facilities	poor	very good	insufficient	4
55	problems	poor	very good	a huge lack of equipment	7
56	problems	poor	very good	a huge lack of equipment	10
57	0	good	0	insufficient	0
58	0	poor	0	insufficient	10
59	0	poor	0	a huge lack of equipment	5
60	problems	poor	good	a huge lack of equipment	10

61	problems	poor	good	a huge lack of equipment	0
62	problems	poor	good	a huge lack of equipment	10
63	0	good	0	insufficient	0
64	problems	poor	good	a huge lack of equipment	10
65	facilities	poor	0	a huge lack of equipment	0
66	0	poor	good	a huge lack of equipment	3
67	0	poor	0	a huge lack of equipment	0
68	facilities	good	very good	sufficient	7
69	0	poor	good	sufficient	5
70	0	poor	0	insufficient	5
71	0	good	0	insufficient	6
72	problems	poor	poor	a huge lack	8
73	0	good	0	sufficient	8
74	0	poor	very good	a huge lack	5
75	0	poor	0	a huge lack	0
76	0	poor	very good	insufficient	5
77	problems	poor	0	insufficient	8
78	problems	poor	good	insufficient	5
79	0	poor	0	0	1
80	problems	poor	0	insufficient	2
81	0	poor	0	a huge lack	5
82	0	good	0	insufficient	5
83	0	poor	0	a huge lack	4
84	0	poor	0	a huge lack	2
85	facilities	poor	good	insufficient	5
86	0	good	0	a huge lack	0
87	0	poor	0	a huge lack	0
88	problems	poor	good	a huge lack	3
89	0	poor	0	a huge lack	8
90	0	good	0	a huge lack	8
91	0	0	0	a huge lack	8
92	0	good	0	a huge lack	8
93	0	poor	0	a huge lack	8
94	facilities	very good	good	a huge lack	8
95	0	poor	0	a huge lack	8
96	problems	good	good	a huge lack	8
97	0	good	0	insufficient	8
98	0	0	0	0	8
99	0	good	0	a huge lack	8
100	0	poor	0	a huge lack	8
101	0	0	0	a huge lack	8
102	0	poor	0	a huge lack	8
103	0	good	0	a huge lack	10
104	problems	poor	0	a huge lack	8
105	0	poor	0	a huge lack	0
106	0	0	0	insufficient	4
107	problems in morocco	poor	very good	0	0
108	0	poor	0	a huge lack	8
109	0	poor	0	insufficient	3
110	0	good	very good	a huge lack	5
111	problems	poor	very good	a huge lack	10
112	facilities	good	very good	sufficient	5
113	0	0	0	insufficient	0
114	problems	poor	good	a huge lack	7
115	0	0	0	insufficient	5
116	0	good	good	insufficient	0
117	0	poor	good	A HUGE LACK	7
118	0	poor	good	A HUGE LACK	8

From "**reasons for crowded patients**" variable to "**conditions of migrations to be cancelled**" variable

	P	Q	R
1	**reason for crowded patients (waiting)**	**desired change in Hospitals**	**conditions of migration to be cancelled**
2	others	higher salaries	partner and child terms
3	service	more doctors/more nurses/more medical staff	equivalence/readmission
4	others	re doctors/more nurses/more medical staff/higher salary/equipment/comput	0
5	others	more doctors/more nurses/higher salary/equipment's/locals	0
6	others	more nurses/more medical staff/higher salary/computers	equivalence/readmission/partner and child terms
7	others	more doctors/less nurses/higher salary/more medical staff	equivalence/readmission
8	others	more doctors/more nurses/higher salary/more medical staff	equivalence/readmission/partner and child terms
9	others	re doctors/more nurses/more medical staff/higher salary/equipment/comput	equivalence/readmission/partner and child terms
10	equipment/Service	re doctors/less nurses/more medical staff/higher salary/equipment/compute	equivalence/readmission
11	others	more doctors/less nurses/more medical staff/higher salary	Readmission
12	equipment/Service/others	less doctors/more nurses/higher salary/more medical staff	equivalence/readmission
13	equipment	re doctors/more nurses/more medical staff/higher salary/equipment/comput	equivalence/partner and child terms
14	equipment/Service	more doctors/more nurses/more medical staff/higher salary	equivalence/readmission/partner and child terms
15	equipment/Service	more doctors/less nurses/more medical staff/higher salary/equipment	equivalence/readmission/partner and child terms
16	equipment/workforce	re doctors/more nurses/more medical staff/higher salary/equipment/comput	uivalence/readmission/partner and child terms/sala
17	equipment/Service/others	more doctors/more nurses/more medical staff/higher salary	readmission/partner and child terms/salary
18	equipment/Service/others	more doctors/more nurses/more medical staff/higher salary	uivalence/readmission/partner and child terms/sala
19	others	more nurses/higher salary/equipment/computers	equivalence/readmission
20	0	more doctors/more nurses/higher salary/equipment/computers/staff	equivalence/partner and child terms
21	equipment/Service/others	more doctors/more nurses/more medical staff/higher salary	readmission/partner and child terms
22	others	re doctors/less nurses/more medical staff/higher salary/equipment/compute	equivalence/readmission/partner and child terms
23	0	more doctors/more nurses/equipment/computers/ethics	0
24	others	more doctors/less nurses/higher salary/equipment/computers/security	0
25	equipment	re doctors/more nurses/more medical staff/higher salary/equipment/comput	equivalence/readmission
26	others	more doctors/more nurses/more medical staff/higher salary	salary/partner and child terms
27	service	re doctors/more nurses/more medical staff/higher salary/equipment/comput	partner and child terms
28	others	more doctors/more nurses/more medical staff/higher salary	equivalence
29	others	more nurses/higher salary/Responsibility	equivalence
30	others	more doctors/more nurses/higher salary	uivalence/readmission/partner and child terms/sala
31	0	more doctors/more nurses/higher salary/computers	salary/partner and child terms
32	equipment/Service/others	more doctors/higher salary/internet connection	equivalence
33	equipment	re doctors/more nurses/more medical staff/higher salary/equipment/comput	readmission
34	others	more medical staff/higher salary	equivalence/readmission
35	service	more nurses/more medical staff/equipment/computers	salary/partner and child terms
36	service	more doctors/more nurses/higher salary	equivalence
37	equipment/Service	more nurses/more medical staff/higher salary	partner and child terms
38	equipment/Service/others	others	readmission/partner and child terms
39	others	more nurses/higher salary	partner and child terms
40	others	more doctors/more nurses/more medical staff/equipment	0
41	equipment/others	more nurses/more medical staff/higher salary	readmission
42	equipment/Service/others	others	readmission/partner and child terms
43	equipment/others	more doctors/more nurses	readmission
44	equipment/Service/others	more doctors/more nurses/more medical staff/equipment	equivalence
45	equipment/Service/others	more doctors/more nurses/more medical staff	equivalence/salary
46	equipment/others	more doctors/more nurses	readmission/partner and child terms
47	others	more doctors/ more nurses/more medical staff/ equipment/ computers	readmission
48	service	more doctors/ more nurses/more medical staff/ equipment/ computers	readmission/partner and child terms
49	others	more doctors/ more nurses/more medical staff/higher salary	equivalence
50	others	more doctors/ more nurses/more medical staff/higher salary	equivalence/readmission
51	service	more doctors/ more nurses/more medical staff/higher salary	equivalence/partner and child terms
52	equipment/Service/others	more doctors/ more nurses/more medical staff/higher salary	equivalence/partner and child terms
53	service	more nurses/more medical staff/higher salary	readmission
54	equipment/service	more doctors/ more nurses/more medical staff/higher salary	equivalence
55	service	more doctors/ more nurses/more medical staff	readmission
56	equipment	more doctors/ more nurses/more medical staff/higher salary	equivalence/readmission/partner and child terms
57	0	more nurses/more medical staff/higher salary	equivalence
58	others	more doctors/ more nurse/higher salary	equivalence/partner and child terms
59	equipment/Service/others	more doctors/ more nurses/more medical staff/higher salary	0
60	others	more nurses/more medical staff/higher salary	equivalence

61	others	others	equivalence/readmission
62	others	more nurses/more medical staff/higher salary	equivalence
63	0	more nurses/more medical staff/higher salary	equivalence
64	others	more nurses/more medical staff/higher salary	equivalence
65	0	more doctors/ more nurses/more medical staff/higher salary	equivalence
66	equipment	more nurses/more medical staff/higher salary	readmission/partner and child terms
67	equipment/Service/others	more doctors/ more nurses/more medical staff/higher salary	equivalence/partner and child terms
68	service	others	0
69	others	higher salaries	partner and child terms
70	service	more doctors/more nurses/more medical staff	equivalence/readmission
71	others	re doctors/more nurses/more medical staff/higher salary/equipment/comput	0
72	service/equipment/others	more nurses/more medical staff/higher salary	equivalence/readmission
73	others	more doctors/more nurses/more medical staff/higher salary	equivalence/readmission
74	others	more medical staff/higher salary	equivalence/readmission
75	others	more nurses/more medical staff/higher salary	equivalence/readmission
76	equipment/service	more nurses/more medical staff/more doctors	readmission/child terms
77	service	more doctors/more nurses/more medical staff/higher salary	equivalence/salary/child terms
78	others	more medical staff/higher salary	salary/child terms
79	others	more doctors/more nurses/more medical staff	equivalence/readmission
80	service	more nurses/more medical staff/higher salary	equivalence/readmission/salary/child terms
81	equipment/service/others	more doctors/more nurses/more medical staff/higher salary	readmission/child terms
82	equipment/service/others	more doctors/more nurses/more medical staff/higher salary	readmission/child terms
83	service	more doctors/more nurses/more medical staff/higher salary	child terms
84	equipment/service/others	more doctors/more nurses/more medical staff/higher salary	equivalence/readmission/child terms
85	equipment/service/others	more doctors/more nurses/more medical staff/higher salary	readmission/child terms
86	equipment/service/others	more doctors/more nurses/more medical staff	0
87	equipment/service	more doctors/more nurses/more medical staff	0
88	0	more doctors/more nurses/more medical staff	0
89	equipment/service	more doctors/ more nurses	0
90	0	more doctors/more nurses/higher salary	0
91	0	more doctors/more nurses/more medical staff	0
92	0	more doctors/more nurses/more medical staff	0
93	equipment/service	more doctors/more nurses	0
94	0	more doctors/ more nurses/more medical staff	0
95	equipment/service	more doctors/ more nurses/more medical staff	equivalence/child terms
96	others	more doctors/more nurses/more medical staff/higher salary	equivalence/salary/child terms/readmission
97	0	more doctors/more nurses/more medical staff/higher salary	equivalence/child terms
98	0	more doctors/more nurses/more medical staff	equivalence/child terms
99	equipment/service	more doctors/more nurses/more medical staff	0
100	equipment/service	more doctors/more nurses/more medical staff	0
101	0	more doctors/more nurses/more medical staff/ higher salary	equivalence/salary
102	equipment	more doctors/more nurses/more medical staff/ higher salary	equivalence/salary
103	equipment/service/others	more doctors/more nurses/ higher salary	0
104	equipment/service	more doctors/more nurses/ higher salary/more medical staff	equivalence/salary
105	equipment/service	more doctors/more nurses/ more medical staff	equivalence/salary/child terms/readmission
106	others	more nurses/more medical staff/higher salary	equivalence/salary/child terms
107	service	more nurses/more medical staff/higher salary/more doctors	0
108	service	more nurses/more medical staff/higher salary/more doctors	equivalence/child terms
109	others	more nurses/more medical staff/higher salary/more doctors	equivalence/readmission
110	others	more doctors/ more nurses	child terms
111	service	more nurses/more medical staff/higher salary	equivalence
112	service	0	0
113	0	more doctors/more medical staff/higher salary	0
114	equipment/service/others	more nurses/more medical staff/higher salary	equivalence/readmission/salary
115	0	more doctors/more nurses/higher salary	equivalence/readmission
116	others	more doctors/more nurses/higher salary/more medical staff	equivalence
117	equipment/service/others	more doctors/more nurses/higher salary/more medical staff	equivalence/readmission/salary/child terms
118	equipment/service/others	more doctors/more nurses/higher salary/more medical staff	equivalence/readmission/salary/child terms

"**Desired modifications in Moroccan medical curriculum**" variable and "**overall rating of research**" variable

	T	U
1	**desired modifications in Moroccan medical curriculums**	**overall rating of research**
2	collaboration/exchange programs/experience with foreign medical universities	financing problems/lack of researchers, time, subjects
3	collaboration/exchange programs/experience with foreign medical universities	financing problems/lack of researchers
4	0	financing problems/interesting actual subjects/lack of time
5	0	financing problems/lack of time
6	less years of specialty/collaboration/exchange programs/experience with foreign medical universities	financing problems/interesting actual subjects/lack of time
7	less years of specialty/collaboration/exchange programs/experience with foreign medical universities	interesting actual subjects/lack of researchers
8	less years of specialty/collaboration/exchange programs/experience with foreign medical universities	financing problems/interesting actual subjects/lack of researcl
9	less years of specialty/collaboration/exchange programs/experience with foreign medical universities	financing problems/interesting actual subjects/lack of researcl
10	less years of specialty/collaboration/exchange programs/experience with foreign medical universities	0
11	less years of specialty/collaboration/exchange programs/experience with foreign medical universities	financing problems
12	less years of specialty/collaboration/exchange programs/experience with foreign medical universities	interesting actual subjects/lack of researchers
13	collaboration/exchange programs/experience with foreign medical universities	financing problems
14	less years of specialty/collaboration/exchange programs/experience with foreign medical universities	ncing problems/interesting actual subjects/lack of researchers/lack of tin
15	collaboration/exchange programs	ncing problems/interesting actual subjects/lack of researchers/lack of tin
16	collaboration/exchange programs	ncing problems/interesting actual subjects/lack of researchers/lack of tin
17	collaboration/experience with foreign medical universities	financing problems/interesting actual subjects
18	more years of specialty	financing problems/lack of researchers
19	more years of specialty/collaboration/exchange programs/experience with foreign medical universities	financing problems/lack of researchers
20	less years of specialty/collaboration/exchange programs/experience with foreign medical universities	ncing problems/interesting actual subjects/lack of researchers/lack of tin
21	collaboration/experience with foreign medical universities	financing problems/excessive production/interesting actual subjects/
22	less years of specialty/collaboration/experience with foreign medical universities	financing problems/lack of researchers/lack of time/lack of sub
23	0	financing problems/interesting actual subjects/lack of researcl
24	0	financing problems/lack of researchers
25	collaboration/exchange programs/experience with foreign medical universities	financing problems/lack of researchers
26	collaboration/exchange programs	financing problems/lack of time
27	collaboration/experience with foreign medical universities	financing problems/excessive production/interesting actual sub
28	collaboration/exchange programs/experience with foreign medical universities	financing problems/lack of researchers
29	collaboration with other medical universities	lack of researchers
30	collaboration/experience with foreign medical universities	financing problems/interesting actual subjects/lack of researcl
31	0	financing problems/lack of researchers
32	collaboration/exchange programs/experience with foreign medical universities	financing problems/lack of researchers
33	collaboration/exchange programs/experience with foreign medical universities	financing problems/lack of researchers
34	less years of specialty/experience with foreign medical universities	lack of researchers/lack of subjects
35	less years of specialty/collaboration/experience with foreign medical universities/exchange programs	financing problems/excessive production/interesting actual su
36	collaboration/exchange programs/experience with foreign medical universities	financing problems/lack of researchers
37	collaboration/exchange programs/experience with foreign medical universities	financing problems/lack of researchers/competition
38	less years of specialty/collaboration/experience with foreign medical universities/exchange programs	interesting actual subjects/lack of opportunities
39	collaboration/exchange programs	financing problems/lack of researchers/lack of time
40	collaboration/exchange programs/experience with foreign medical universities	financing problems/lack of researchers
41	collaboration/exchange programs	financing problems/lack of researchers/lack of time
42	less years of specialty/experience with foreign medical universities	interesting actual subjects/lack of researchers/lack of opport
43	collaboration/exchange programs/experience with foreign medical universities	financing problems/interesting actual subjects/lack of researc
44	collaboration/exchange programs	financing problems/lack of researchers
45	collaboration	financing problems/lack of researchers/lack of time
46	collaboration	financing problems/lack of researchers
47	collaboration/ experience with foreig, medical universities	financing problems/lack of researchers
48	collaboration/ experience with foreig, medical universities	financing problems/lack of researchers
49	collaboration/ experience with foreign medical universities	financing problems/lack of researchers/lack of time
50	0	financing problems
51	collaboration/ experience with foreign medical universities	financing problems/lack of researchers
52	collaboration/exchange programs	financing problems/lack of researchers/lack of subjects/lack
53	more years of specialty/collaboration/exchange programs/experience with foreign medical universities	financing problems/lack of researchers/lack of subjects/lack
54	collaboration/exchange programs/experience with foreign medical universities	financing problems/lack of researchers/lack of subjects
55	collaboration/exchange programs	financing problems/lack of researchers
56	collaboration/exchange programs/experience with foreign medical universities	financing problems/ lack of researchers/lack of subject
57	collaboration/experience with foreign medical universities	financing problems/diversity of subjects
58	collaboration/exchange programs/experience with foreign medical universities	financing problems/ lack of researchers/lack of time
59	less years of specialty	financing problems
60	collaboration/experience with foreign medical universities	financing problems/ lack of researchers

61	collaboration/exchange programs/experience with foreign medical universities	0
62	collaboration/experience with foreign medical universities	financing problems/ lack of researchers
63	collaboration/experience with foreign medical universities	financing problems/diversity of subjects
64	collaboration/experience with foreign medical universities	financing problems/ lack of researchers
65	collaboration/exchange programs/experience with foreign medical universities	financing problems/ lack of researchers
66	Collaboration	lack of researchers
67	0	Financing problems
68	collaboration/exchange programs	financing problems/lack of researchers/diversity of subje
69	collaboration/exchange programs/experience with foreign medical universities	financing problems/lack of researchers, time, subjects
70	collaboration/exchange programs/experience with foreign medical universities	financing problems/lack of researchers
71	0	financing problems/interesting actual subjects/lack of tim
72	less years/collaboration/exchange/experience	lack of researchers/lack of time/lack of subjects
73	less years/collaboration/exchange/experience	financing problems/lack of researchers
74	collaboration/exchange/experience	lack of time/lack of subjects
75	collaboration/exchange/experience	financing problems/interesting actual subjects/lack of resear
76	collabiration/experience	0
77	collaboration /exchange	financing problems/lack of researchers/lack of time/lack of su
78	collaboration/exchange/experience	financing problems/lack of researchers/lack of subjects
79	less years/collaboration/exchange/experience	financing problems/competitivity
80	less years/collaboration/exchange/experience	financing problems/lack of researchers/lack of time
81	collaboration/exchange/experience	financing problems/interesting actual subjects/lack of researchers/
82	collaboration/exchange/experience	financing problems/lack of researchers/lack of time/lack of subjects/c
83	callaboration/experiance	financing problems/lack of researchers/lack of time
84	callaboration/experiance	financing problems/compatitivities/lack of time
85	collaboration/exchange/experience	financing problems/compatitivities/lack of time/lack of resear
86	collaboration/exchange/experience	financing problems
87	collaboration/exchange/experience	financing problems/lack of researchers
88	collaboration/exchange/experience	financing problems/lack of researchers
89	collaboration/exchange/experience	financing problems
90	collaboration/exchange/experience	well funded/lack of researchers
91	collaboration/exchange/experience	financing problems
92	collaboration/exchange/experience	financing problems/lack of researchers
93	collaboration/exchange/experience	financing problems/lack of researchers/lack of time/lack of sub
94	collaboration/exchange/experience	financing problems/lack of researchers
95	collaboration/exchange/experience	financing problems/lack of researchers/competitivities
96	collaboration/experiance	financing problem/lack of researchers
97	more years of specialty/collaboration/exchange/experiance	financing problems/lack of researchers/lack of subjects
98	collaboration/exchange/experience	financing problems/competitivities/lack of time/lack of researchers/lac
99	collaboration/exchange/experience	lack of researchers
100	collaboration/exchange/experience	financing problems/competitivities
101	collaboration/exchange/experience	financing problems/competitivities/lack of time/lack of researchers/lac
102	collaboration/exchange/experience	financing problems/lack of researchers
103	collaboration/exchange/experience	financing problems/lack of researchers
104	collaboration/exchange/experience	financing problems/competitivities/lack of researchers
105	collaboration/exchange/experience	financing problems/lack of researchers
106	collaboration/exchange/experience	financing problems/lack of researchers/lack of time
107	collaboration/exchange/experience	lack of researchers
108	collaboration/exchange/experience	financing problems/lack of researchers
109	0	financing problems
110	collaboration/exchange/experience	financing problems/lack o researchers
111	collaboration/experience	financing problems/lack o researchers
112	collaboration/experience/exchange	financing problems/lack o researchers/competitivities
113	0	0
114	collaboration/exchange/experience	financing problems/lack ofresearchers/interesting actual subj
115	collaboration/exchange/experience	financing problems/interesting actual subject/lack of research
116	collaboration/experience	financing problems/lack of researchers/lack of time
117	collaboration/exchange/experience	financing problems/lack of researchers
118	collaboration/exchange/experience	financing problems/lack of researchers

From "**Mobility to rural areas**" variable to "**number of languages**" variable

	V	W	X	Y	Z	AA
1	mobility to rural areas	condition	DVD acceptance	if yes/what's the plan	migration destination	Languages
2	yes	compensations/ acceptable life conditions	yes	work in private sector	Canada	3
3	no	0	yes	work in private sector	0	3
4	no	0	yes	public hospital sector	0	2
5	no	0	yes	work in private sector	0	4
6	no	0	yes	work in private sector	0	3
7	yes	0	no	0	0	4
8	no	0	0	0	Canada	4
9	no	0	yes	work in private sector	France	3
10	yes	0	yes	Immigration	Canada	4
11	no	0	yes	business/Immigration	Canada	3
12	no	0	yes	work in private sector	0	3
13	yes	compensations/ Family grouping	yes	business	Australia	2
14	yes	good work conditions	no	work in private sector	Canada/USA	3
15	no	0	yes	work in private sector/business	Canada/USA	3
16	yes	For a specific duration/transportation/fairness	yes	work in private sector/immigration	Canada	3
17	yes	compensation	yes	work in private	Canada	3
18	yes	compensation	no	Business	France/Canada/USA/UK	2
19	no	0	yes	work in private sector/immigration	USA	3
20	no	0	no	0	France	3
21	no	0	yes	work in private sector	France	3
22	yes	0	yes	work in private sector	France	3
23	yes	acceptable life conditions	yes	work in private sector	0	2
24	yes	compensation/acceptable life conditions	no	0	0	2
25	no	0	no	0	France	2
26	no	0	yes	work in private sector	France	3
27	yes	0	no	associations work	0	2
28	yes	compensation/acceptable life conditions	no	0	France	3
29	yes	compensation	0	0	0	3
30	no	0	yes	work in private sector	france	3
31	yes	acceptable work conditions	0	0	Arabie saoudite	3
32	yes	acceptable life conditions	no	0	0	4
33	no	0	no	work in private sector	canada	2
34	yes	compensation	0	Immigration	france	3
35	no	0	yes	business/Immigration	canada	3
36	0	part time job	0	part time job	France	3
37	yes	salary/equipment/infrastructure	yes	work in private sector	UK	3
38	yes	0	yes	work in private sector	France	3
39	no	0	yes	business	0	3
40	yes	equipment	no	0	france	3
41	yes	compensation	no	work in private sector	canada	3
42	yes	0	yes	work in private sector	france	3
43	no	0	no	others	UK	3
44	yes	salary	no	0	Canada/USA	3
45	no	0	yes	business	France	3
46	no	0	yes	business	canada	3
47	no	equipment	no	0	Belgium	3
48	yes	0	yes	business	canada	3
49	yes	equipment	no	0	France/Canada	3
50	yes	equipment	no	business	canada/US/England	2
51	yes	equipment	yes	business/Immigration	canada/US/England	3
52	no	0	yes	business	France/canada/US/Engla	3
53	yes	less time	yes	work in private sector	canada	2
54	no	0	yes	work in private sector	France	3
55	yes	equipment	no	0	0	3
56	no	0	no	0	canada	2
57	no	0	yes	work in private sector	0	4
58	yes	work conditions	yes	work in private sector	France	3
59	no	equipment	yes	work in private sector	0	3
60	no	0	yes	work in private sector	France	3

61	no	0	no	0	France/Canada	3
62	yes	0	yes	work in private sector	France	3
63	no	0	yes	WORK IN PRIVATE SECTOR	0	4
64	no	0	yes	WORK IN PRIVATE SECTOR	France	3
65	yes	salary	yes	migrate	canada/england	4
66	no	work conditions	yes	business/work in private sector	canada	4
67	no	0	yes	business/work in private sector	France	3
68	yes	work conditions	no	start a business	0	3
69	yes	compensations/ acceptable life conditions	yes	work in private sector	Canada	3
70	no	0	yes	work in private sector	0	3
71	no	0	yes	work in private sector	0	2
72	no	0	yes	Work in private sector/start busine	canada/US	3
73	yes	0	yes	work in private sector	France/canada	3
74	yes	equipment/housing	yes	work in private sector	France/le royaume uni	2
75	yes	equipment/housing	yes	work in private sector/migration	canada	3
76	yes	0	0	work in private sector	canada	1
77	yes	0	no	work in private sector/start busine	USA	2
78	yes	better work conditions	yes	work in private sector	0	4
79	yes	0	no	work in private sector	0	3
80	0	0	yes	start business	USA	4
81	no	0	yes	work in private sector	France	2
82	yes	0	yes	work in private sector	France/USA	3
83	yes	obligé	no	work in private sector	France	3
84	no	0	yes	work in private sector	France/le royaume uni	4
85	yes	indeminisation/avantages	yes	work in private sector	France/canada	3
86	no	0	no	la santé public	0	3
87	no	0	yes	work in private sector	canada	3
88	no	0	yes	work in private sector	0	4
89	no	0	no	work in private sector	canada	3
90	no	0	yes	work in private sector	le royaume uni	3
91	0	0	0	work in private sector	canada	3
92	no	0	yes	work in private sector	canada	3
93	no	0	yes	work in private sector	canada	3
94	no	0	0	work in private sector	France	3
95	no	0	yes	work in private sector	le royaume uni	4
96	no	0	0	0	France	4
97	no	0	0	start business	canada	4
98	yes	pour une durée limitee	0	0	France	3
99	no	0	yes	work in private sector	France	3
100	no	0	yes	work in private sector	canada	3
101	no	0	0	work in private sector	France	3
102	no	0	yes	work in private sector	0	3
103	no	0	yes	0	0	3
104	yes	un salaire plus elevé	yes	work in private sector	canada	3
105	no	0	no	finish my career with the Public He	0	3
106	yes	well adapt working time	0	0	canada	2
107	no	0	no	work in private sector	USA	4
108	yes	0	yes	start business/migration	cadana/USA/le royaume	3
109	yes	power/navit	no	start business	canada	1
110	yes	time and a rotation compensation + encou	yes	start business	0	2
111	yes	es conditions de travail,motivationsociales,ind	yes	migration	France/le royaume uni	3
112	no	comfort	no	work in private sector	France/USA	3
113	0	0	0	0	0	2
114	no	0	no	work in private sector	France	2
115	yes	travailler dans de bonne conditions	0	0	canada/US	4
116	yes	equipment/housing	0	0	France/canada	3
117	no	0	yes	work in private sector/migration	canada	3
118	no	0	yes	work in private sector/migration	USA	3