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Scientific diasporas, transnationalism and home-country development: evidence from a study of skilled Moldovans abroad

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This paper discusses the Moldovan ‘scientific diaspora’ made up of students, researchers and those engaged in professional activities abroad, and their propensity to either return or engage in home-country development initiatives. Moldova has suffered a significant loss of its qualified personnel since 1991, due to a difficult political transition and current low level of development. An online survey, supplemented by follow-up interviews, enabled the authors to outline the parameters of the Moldovan scientific diaspora and its current and potential future transnational activities. Although skilled Moldovans do feel positive about their study and work experiences abroad, they are also keen to help in the development of their home country. However, several determinants are necessary to make this happen: information about institutional initiatives, political stability, improved socio-economic prospects and an adequate infrastructure, a shared vision of the diaspora role, as well as specific instruments for engagement. Policy options are discussed in the conclusion.

Keywords: scientific diaspora; Moldova; transnationalism; brain drain and brain gain; home-country development

Introduction

Large-scale emigration by scientists and skilled professionals from developing and transition countries in search of better opportunities and career prospects in high-income industrialized countries, commonly known as ‘brain drain’, is a major concern for the respective home countries. Yet, the emigrated human capital can also act as a bridge between the home and host countries, promoting the transfer of ideas, skills and knowledge. Examples have shown that foreign-based scientists and skilled professionals often undertake transnational actions that benefit the communities in home countries in the form of training, education and research collaborations that reinforce local capacities, as well as through investment and entrepreneurial activities. One such example is that of Romanian scientists abroad who were mobilized through the creation of the Ad-Astra Network in the early 2000s in favour of the reform of the education and research sector in Romania (Nedelcu 2008). Other

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instances include those of Indian and Chinese skilled professionals and technicians living in the United States who in the 1990s contributed to a strengthening of their countries' scientific and technological capacities through knowledge and technology transfers as well as investment linkages (Saxenian 2005; 2006). Finally, Colombian scientists based in Swiss academic and research institutions have boosted bilateral scientific collaboration for more than two decades strengthening a critical mass in key areas for the development of Colombia (Tejada 2012).

When considering skilled migration within the migration and development nexus, both academic research and policy discourse tend to refer to two main inter-related topics: firstly, the brain gain vs. brain drain debate and the challenges of retaining and attracting scientists and skilled professionals; secondly the diaspora option, encouraging interconnections between home and host countries allowing the transfer of various resources such as knowledge, technology, investments and financial remittances.

For Eastern European countries, the impact of skilled migration on development and the role of diasporas are new issues on the public agenda. In the Republic of Moldova, the mass emigration of skilled human capital is a tough challenge that has hindered the advancement of science, research and innovation in the 20 years since independence. Severe economic crises and a long political transition saw science neglected as a national priority until recently. The ensuing limited availability of infrastructure, employment opportunities and income prospects led to the massive emigration of scientists and skilled professionals. Over the past few years, the government has implemented specific initiatives under the auspices of the Academy of Sciences of Moldova (ASM) to counteract this loss, thereby opening up cooperation possibilities with Moldovan scientists abroad. Recognizing that scientists abroad can remain interconnected and contribute, Moldova offers an example in the region of policy strategies being set-up to address brain drain through the mobilization of scientific diasporas, and specifically by encouraging their involvement in activities related to research, technological development, innovation and education. Nevertheless, we still lack empirical evidence as to what the Moldovan scientific diaspora's transnationalism has been in practice and the opportunities and constraints that influence transnational ties and cooperation mechanisms in the home and host countries. By focusing on skilled migration from Moldova, this article seeks to fill some of the gaps in existing research. Based on the findings of a recent study, it provides an analysis of primary data on skilled Moldovans abroad collected through both an online survey and qualitative interviews.

The Republic of Moldova boasts a significant tradition of excellence in science, research and education; yet it lags behind in the various international rankings on prosperity. Therefore, it is crucial to address the brain drain challenge in both research and policy discussions about the relationship between migration, transnationalism and development. The Moldovan case study can serve as an example to examine the problems and prospects that arise within Eastern European countries going through a transitional phase, with regard to how they deal with the challenge of linking scientists abroad to national strategies for socio-economic progress. Since economic enabling factors such as precarious environments for scientific research, limited infrastructure, low salaries and restricted scientific and career prospects have led to the emigration of human capital, this study suggests that structural development conditions in Moldova need to improve if the country is to tap into the diasporas' potential.

Our paper has several objectives. Firstly, it seeks to promote a focus on the scientific diaspora option in research and discussions on the migration and development nexus. Secondly, it looks at the theoretical implications of this option. Thirdly, it offers an evidence-based analysis aimed at identifying the determinants of the transnationalism of skilled Moldovans and their cooperation activities with the national scientific community. Finally, it provides specific policy recommendations for Moldova.

The Moldovan context

To put the Moldovan case study into context, we offer a brief overview of the socio-economic and political situation of the country. Like other Eastern European countries, the Republic of Moldova underwent considerable pressure during its transition from a totalitarian and centralized economic system to a democracy and market economy after independence in 1991. During the 1990s the country faced a period of transformation with a significant deterioration of economic and social indicators, very limited access to basic public services and the impoverishment of large sections of the population. Moldova's political instability and a lack of complete control over its entire territory after the self-declared *de facto* independence of the state of Transnistria represented additional challenges. The complexity and magnitude of these challenges have prevented the country from equalling its pre-1991 GDP levels up to now, and today it is considered the poorest country in Europe with a GDP per capita of US\$2900 and 65% of its population living below the poverty line (UNDP 2011a). Moldova ranked 111 worldwide amongst the 187 countries included in the 2011 UNDP Human Development Index (UNDP 2011a), showing the country still has a very long way to go towards an effective poverty eradication. Notwithstanding modest growth in recent years, the National Human Development Report shows a decrease in the employment rate from 55% in 2000 to 40% in 2009, confirming the unsustainable nature of poverty reduction (UNDP 2011b). A further problem in the country is the lack of a strong and cohesive national identity. The multi-ethnic population, many minority groups and historically rooted clashes, as well as opposing sides representing competing political positions, make it difficult to establish a Moldovan identity amongst the population, and this constantly influences a political discourse divided between pro-Russian and pro-Western forces.

Today Moldova has one of the world's highest emigration rates. Estimates show 600,000 to 1 million Moldovans living outside the country. The UNDP figures show 23% of the total active population working abroad in 2009 (UNDP 2011b). There have been different stages of Moldovan emigration. The first stage, between 1991 and 1998, saw small-scale migration flows mainly for ethnic and political reasons and family reunification, particularly to Israel, the USA and Germany. After 1998, migration flows increased as a consequence of the regional economic crisis. The lack of opportunities and the poor quality of life forced many Moldovans to leave in search of better prospects in several destinations mostly in the Commonwealth of Independent States, principally Russia, and in Western Europe. According to the International Organization for Migration (IOM), the total number of emigrants living abroad grew from slightly less than 100,000 in 1999 to more than 400,000 by the end of 2005 (Lücke, Mahmoud, and Pinger 2007). This stage started with migration flows involving unskilled workers mostly, but in recent years

the trend has changed with increasing flows of scientists, skilled professionals and students. Gaugas (2004) emphasizes the lack of connection between the educational system and the labour market. As a result, the increasing number of higher education graduates competing for scarce positions is an important push factor forcing skilled Moldovans to search for options abroad. A recent OECD (2012) study shows that 56% of people aged between 15 and 24, and 37% of those with a third-level education would leave permanently if they had the opportunity. Financial remittances represent a remarkable 23% of Moldovan GDP, placing the country amongst those with the highest remittance inflows in relation to GDP worldwide (World Bank 2011). The importance of these remittances is enormous as 26% of Moldovan households depend on them for their daily and basic consumption needs; yet they hardly influence or ameliorate structural constraints (Lücke, Mahmoud, and Pinger 2007; Orozco 2008).

Science and technology was a neglected sector in the country for almost 15 years after independence. Public investment in science and technology fell drastically between 1990, when it was 0.73% of GDP, and 2000, when it was only 0.18% of GDP (ASM 2010). Science, research and innovation activities suffered major degradation due to a lack of proper funding, adequate wages and up-to-date infrastructure. At a management level, the methods of organizing science remained conservative and the legislative framework had a regressive rather than a stimulating character. However, the scientific excellence of Moldovan researchers and the reputation of the country's science schools remained high; but this alone could not prevent many scientists from emigrating in search of better opportunities abroad, and indeed it even acted as a push factor. Others left the national research system to join other fields of activity in the country, where they were overqualified in most cases. As a result, the scientific potential of Moldova fell by 83% in 15 years, dropping from a total of 30,000 scientific researchers in the early 1990s to less than 5000 in 2004 (ASM 2010). By 1 January 2011, the country had only 5216 employees registered in the research and development R&D area.¹ The year 2004 marked a turning point with Parliament's ratification of the Code on Science and Innovation and the adoption of the Partnership Agreement between the Government and ASM, aimed at ensuring sustained support for science and R&D-related activities and offering better conditions to scientists. As a result, state investment in science and technology increased systematically, reaching 0.74% of GDP in 2008. Additionally, the ASM launched a focused strategy in 2008 to encourage linkages with skilled Moldovans abroad with a view to overcoming the brain drain challenge. Two complementary initiatives have been implemented recently, opening up cooperation possibilities between Moldovan scientists abroad and the national scientific community. The first is the IOM-ASM temporary return programme for Moldovan scientists and young researchers, implemented within the framework of the EU-Moldova Mobility Partnership.² The second is the ASM-EPFL research project providing knowledge-based evidence on Moldovan skilled emigration, transnational links and development impact.³ In recent years, the country has also tried to involve skilled Moldovans abroad in the promotion of its integration into the European Union (EU). However, although Moldova participates in the European Neighbourhood Policy (ENP) and is already integrated into the European Research Area through its recent association with the EU FP7 Programme, accession to the EU will certainly not happen overnight.

Conceptual considerations

The increasing scale and scope of international migration offers new concepts and perspectives for both research and political discussion as they seek to explain its intersections with development. These include a new vision of the emigration of human capital, examining challenges and opportunities resulting from the transnationalism of skilled migrants and reverse knowledge transfers to home countries.

If we take a quick look at the evolution of the academic debate on migration and development over the last few decades, and skilled migration in particular, we can see how the pessimistic and sceptical brain drain option of the 1970s and 1980s underwent a significant change from the 1990s. This switch involved more thorough or pluralist alternatives influenced by the new economy of labour migration and the opening up of national resources within a knowledge-based economy; accordingly related perspectives started to focus on migrant transnationalism, networks and cooperation links with home countries. This new standpoint arose when, in an attempt to move from general formulations to the generation of policies that could deal with this phenomenon, the limitations explaining the loss of human capital became obvious, leading to alternative proposals promoting the use of skilled migrants' resources through knowledge transfer and circulation strategies. This is how scientists and skilled professionals abroad started to be perceived as available capital, susceptible to being mobilized to benefit home countries (Gaillard and Gaillard 1999; Johnson and Regets 1998; Meyer 2001).

Following this paradigm change, optimistic functionalist visions acquired prominence from 2000 onwards, making transnationalism a popular theoretical framework in the most recent studies on migration and its interfaces with development. This vision emphasizes financial remittances as an important source of growth for home countries (Adams 2003; Agunias 2006; de Haas 2005) and it praises the transnational ties migrants have with their communities of origin (Portes 2001; Vertovec 2004). Transnationalism sees individuals as carriers of their own identity without being uprooted from their home country, and they belong to several places simultaneously whilst building up and maintaining links over borders (Levitt and Glick Schiller 2004; Vertovec 2001). Several empirical studies underline the possibility of migrants acting as agents of development (de Haas 2006; Katseli, Lucas, and Xenogiani 2006; Lowell and Gerova 2004) and attempt to identify conditions and factors necessary to generate positive impacts. Continuing along similar lines, other studies have shown how international migration and the mobility of human capital can lead to a strengthening of the scientific and technological capacities of home countries. Examples from India and China (Saxenian 2005; 2006) illustrate the contributions that engineers and technicians make to their home countries through knowledge, investment and technology transfers. In other cases, countries affected by brain drain have benefitted from temporary returns and circular migration schemes (Agunias and Newland 2007; Wickramasekara 2011).

Another recent evolution is the recognition of *scientific diasporas* as new development actors (Barré et al. 2003; Tejada and Bolay 2010). Scientific diasporas bring together groups of scientists, engineers and skilled professionals acting mainly to produce new knowledge and collectively create cooperation opportunities with home countries. Their networking actions are based on the logic of connectivity and the multiplier effect of a personal interest to participate in a community project (Meyer 2001). The knowledge circulation dynamics of scientific diasporas see them

considered as *knowledge communities* (Foray 2004) with the potential to act as agents of change back home (Tejada 2012). In some cases, scientific diasporas form networks using information and communication technologies to boost their connectivity with home countries. Whilst many scientific diaspora networks promote knowledge circulation through collective transnationalism, their efficiency to create an impact and their sustainability over time have been questioned; and there are many failed examples (Meyer 2011). Network benefits for migrants are more apparent at an individual level, providing social contacts (Bruggeman 2008) and sustained access to social capital (Bourdieu 1986).

Specific factors are highlighted in the literature as influencing diaspora transnationalism. These include the reasons for emigrating, migrants' socio-demographic profile, as well as their length of stay and main activity in the host countries. The conditions of migrants in host countries, and specifically their level of integration, are also shown to exert important influence. Many studies have examined the link between integration and transnationalism, considering transnational ties and incorporation in the host society as entwined and concurrent social processes (Itzigsohn and Giorguli-Saucedo 2002). Yet, the different alternative views in the analysis of the options suggested by this correspondence of processes make the discussion inconclusive as to whether one facilitates or hinders the other. Migrants' return planning is another key factor inducing diaspora transnationalism, and its interplay with integration is often referred to in the literature (de Haas and Fokkema 2011). By considering their appraisal of what their future plan may look like, migrants tend to invest their time and resources in activities related to such a priority project. If they plan to return to the home country, it is likely that they will attach significant importance to maintaining their transnational ties, and place less importance on integration. Similarly, it is assumed that migrants' integration in the host countries weakens their transnational ties and decreases return intentions. Nonetheless, here the discussion also remains inconclusive, and a recent study by de Haas and Fokkema (2011) into the impact of integration and transnational ties on return migration plans disputes the theoretical arguments that conceptualize return migration and transnationalism as a cause or an effect of integration failure.⁴

The value of group mobilization and structures in the form of networks or associations has been shown to be a condition for encouraging a diaspora's collective transnationalism. Saxenian (2006) refers to organized collective actions in the form of diaspora networks of technicians or engineers linked by their international exposure and shared cultural ties, as determinants of the duration of collaborations with home countries over time. From a diaspora standpoint, we should see both a common cultural, ethnic or national identity and a collective relation of solidarity with the home country, as the glue binding migrants together in communitarian actions. Such actions in the form of collective transnational practices are indeed a result of diasporas' shared identity (Bordes Benayoun and Schnapper 2006; Butler 2001).

Whilst the significance of knowledge and ideas embedded in human capital as a development catalyst is widely recognized, the relationship between diasporas' transferred skills and knowledge, on the one hand, and socio-economic progress on the other, is not straightforward; and in reality we can see that local society does not benefit from these practices in many cases. Furthermore, the potential positive impact of skilled migration is not similar for all countries. The discussion remains complex and far from conclusive, mainly as a result of two issues. First of all, the divergent approaches are often based on different analytical levels entailed in the multidimensionality of the

development concept, which may refer specifically to the distinct micro, meso or macro levels of the impacts. Secondly, the enabling environment in the home country matters and the diverse contexts across countries help to explain why migration can play a positive development role in some cases but not in others. As de Haas (2008) argues, the extent to which migrants' contributions can influence positive socio-economic change in home countries depends on broad structural conditions. He suggests paying greater attention to the relevance of structural problems that limit diasporas' interventions in home countries and to the role that state and other actors, including international organizations, can play in creating favourable environments. Indeed, the specific country setting under which migration occurs determines its development impact, and examples have shown that benefitting from diaspora knowledge transfer and circulation is only possible when home countries offer an adequate scientific and technological infrastructure.

What role do these determinants play in the case of skilled Moldovans abroad? What are the main challenges and opportunities that Moldova has to capitalize for an effective scientific diaspora transnationalism? To respond to these questions, we will now consider the above conceptual considerations and use a transnational standpoint as an analytical framework to provide a complementary vision of the host and home countries. By examining the transnational links of skilled Moldovans abroad, and specifically their cooperation actions with the scientific community based in Moldova, we hope to shed light on the influence that the aforementioned determinants can have on their transnational actions.

Methodology

The rest of this article draws on an analysis of the experiences of skilled Moldovans abroad aimed at understanding the determinants of their transnational cooperation actions with Moldova.⁵ We are particularly interested in their conditions and experiences in host countries, the ties with the home country, as well as their perceptions of both the environment in the host countries and the situation in Moldova, which affect their transnational interventions and cooperation prospects, and their migration plans.

The data presented here were collected between 2011 and 2012 using a primary online survey applied to a target group defined as 'members of the Moldovan scientific diaspora'. This refers to Moldovan scientists, researchers and skilled professionals living abroad, as well as postgraduate students (MA and PhD) from all disciplines, professional areas and sectors. Respondents were asked about their motivations for emigrating, experiences in host countries, links with Moldova, future plans, and perceptions of their role in home-country development. The survey was answered by 197 members of the Moldovan scientific diaspora. To complement this, 27 qualitative face-to-face interviews were conducted with Moldovans selected from the same group. Given the impossibility of precisely knowing the entire population of skilled Moldovans abroad, the purposive sampling method was applied.⁶ To recruit the sample, we used both formal channels (email invitations sent to people on ASM lists, ASM newsletter subscribers, diaspora associations and organisations, and consulates and embassies); and informal channels such as social networks and the snowball principle. As the response rate was initially lower than expected, a second round of email messages was despatched after four months. The following sections present some of the observations of the survey and are complemented with excerpts from the testimonies of the Moldovans interviewed.

Empirical evidence of skilled Moldovans abroad

The basic parameters of the survey respondents are as follows. Most of the 197 Moldovans surveyed are aged between 26 and 35; mostly female (58%); half are married and less than half have children. Half of them hold a Master's degree, and half have either a PhD or a Bachelor's degree, in the main disciplines of economics, social and political sciences, and management and business. Two-thirds left Moldova between 2000 and 2010 and around one-third before the year 2000.

Migration determinants and conditions in host countries

Skilled Moldovans mainly choose their destinations on the basis of opportunities offered and less because of geographical and cultural proximity or a shared language. The main destination countries for the respondents surveyed are in Western Europe (Germany, France, Belgium, Spain, the Netherlands, UK and Switzerland), the Commonwealth of Independent States and neighbouring countries (Russia, Ukraine and Romania), and North America (the USA and Canada). We observed that push factors in Moldova are stronger than pull factors in destination countries, because the home-country context is the main catalyst behind skilled Moldovans deciding to emigrate. Political and economic instability and the consequential lack of professional prospects and the precarious life quality are major push factors. Skilled Moldovans emigrate in search of better living standards, improved career prospects, further education and scientific advancement. Moldovans also see migration as a means of moving to a new professional context offering better rewards for labour and fairer competition which they think are lacking in Moldova. The relevance of international exposure for their scientific careers is an important migration determinant. One scientist highlighted his desire to learn new research methodologies and to access modern infrastructure which was impossible during Soviet years:

Until 1991 researchers from Moldova had no access to international publications, scientific events or research projects, and when the opportunity opened up for me to apply for a research grant, I went to Germany.

The search for further training abroad is another important motivation. Indeed, more and more skilled Moldovans emigrate as students. Moldovans feel their migration project will provide international exposure and valuable experience that will be appreciated in Moldova, and they expect to use the acquired knowledge for its benefit.

The most important factor behind the decision to leave is personal motivation, as indicated by 80% of respondents; the influence of family, colleagues and friends on their decisions is less important. Therefore, skilled migration from Moldova may be understood as the result of individual strategies established to improve personal conditions at both a professional and private level. The families back in Moldova view their departure with a sense of pride for having accomplished their professional or educational project abroad. The emigration process is seen as an achievement, and parents prefer to see their children depart and succeed abroad rather than remain dissatisfied at home under precarious conditions.

Skilled Moldovans have a positive perception of the environment offered by host countries, particularly regarding employment and career opportunities, income level, level of scientific research and the living environment. However, the ease of doing business and obtaining a residence and/or working permit is a constraint they

still face. Most Moldovans believe they are well integrated socially in the host countries because of their good knowledge of local languages and their participation in local organizations and associations. More than half hold temporary residence status; less than half are permanent residents or citizens of the host country. With regard to their professional integration, we can see that the majority of those in paid employment consider themselves to be well established professionally and show a high level of satisfaction with their jobs in the host country. If Moldovans are working within their field of specialization and feel their positions correspond to their qualifications, they consider that their technical and scientific competences have improved during their stay abroad and that their skill levels have increased.

With regard to students, we can see that they choose their destinations according to the prestige of institutions or academic programmes or they are guided by scholarships. Their selection is also influenced by expected employment opportunities after graduation and their perception of policies in destination countries enabling such migration projects. Policies in some destination countries, mostly in North America and Western Europe, focused on attracting skilled human capital, are increasingly enabling international students to become part of the labour force. We can see that completing their studies in host countries is a general trend even for those Moldovans who emigrated for professional reasons. In order to adapt their qualifications to the requirements of the labour market in the host country, they pursue further training there as a necessary step towards accessing better employment opportunities. The discussion indicates that 'probationary immigration' (Kuptsch 2006) by Moldovan students is usually a precursor to labour migration, encouraging the transformation of students into qualified workers. Whilst Moldovans generally complete a Master's degree in their country of destination as a primary means of entering the local labour market, some opt to do a PhD.

Moldovans participate in professional associations and networks established abroad, which can be differentiated into two types. The first type are associations or professional networks of an exclusive nature focused on specific areas or disciplines, open to members from any country. Through their participation, skilled Moldovans establish transnational linkages with scientists across the world and have access to collaboration opportunities, which Moldova could also benefit from. The second type are associations that bring the Moldovan community abroad together and promote an exchange of experiences and the implementation of collective projects in favour of the home country. Compared to the first type, these are less exclusive (beyond, that is, the criterion of being Moldovan) and have significant implications thanks to their capacity to forge links amongst the diaspora, gather scattered individual efforts and promote collective action. However, their actions remain sporadic and are mostly focused on promoting cultural and social activities. Beyond these two types, apart from some emerging exceptions, there is no formal collaboration mechanism exclusively for Moldovan scientists and skilled professionals abroad in the form of a specialized scientific diaspora association or network which could boost the magnitude and impact of diaspora knowledge transfers (Meyer 2001). We can see that the lack of a collective identity within the Moldovan diaspora, which reflects the existing national identity problem and hinders collective transnationalism, is nonetheless evolving to more structured communitarian-focused initiatives; this is also related to the fact that mass emigration is still a recent phenomenon in Moldova. These observations are consistent with the concept of an 'emerging diaspora' (Buga 2011), which shows that the associative activities of

Moldovans abroad are made up of small informal networks created by Moldovans living in the same countries to promote shared cultural values and channel common efforts to benefit Moldova. These collective actions are seen as a 'sample of the evolution of the process of structuring the Moldovan diaspora towards a desire to affirm themselves as a group' (Bugă 2011, 331).

Transnational links and development impact

Moldovans tend to cultivate their transnational links with the home country, and they communicate regularly with relatives, friends and colleagues back home. The majority return to Moldova once or several times a year, mainly to visit relatives and friends and to a lesser extent for scientific and academic exchanges. We observe that permanent settlement abroad and integration in the host societies does not necessarily result in a decline in the intensity of Moldovans' ties with their family and community back in Moldova. However, being able to determine whether the transnationalism of skilled Moldovans is concurrent with their integration in the host country (Itzigsohn and Giorguli-Saucedo 2002) or whether it works as a distinct path (Portes, Haller, and Guarnizo 2002) remains an empirical question still to be concretely answered.

In order to shed light on the feelings of skilled Moldovans about contributing to the progress of their home country and to identify the influence of their main activity in the destination country, we divided the respondents into three different groups based on their activity profile – students, scientists and researchers, and professionals.⁷ Interest in Moldova's development is high for all three groups of respondents. They believe they could generally contribute to Moldova through their activities abroad and more precisely in terms of improving the image of Moldova, increasing the pool of better trained students, promoting investment, and improving the quality of science and research. We can see that, whilst students believe they can contribute through the education and skills gained abroad, professionals think they can promote an increase in foreign investment in Moldova. Scientists and researchers feel an attachment to Moldova through science and believe they can contribute through reverse knowledge transfers within their field of study.

There are some important qualitative differences between the transnational cooperation of Moldovan scientists and researchers, on the one hand, and those of students and professionals, on the other. These differences have mostly to do with the value of scientific exchange and collaboration, and the knowledge circulation created. Provided that Moldovan scientists have attained stable positions and a critical mass through their international exposure and networks, their transnational cooperation actions bridging science and innovation between scientists in the home country and their colleagues in host countries may open opportunities for new collaboration projects, which might generate important gains for Moldova. Concretely, systematic scientific collaboration may progressively enable advances in research, the reinforcement of local capacities and trigger further positive knowledge spillover effects back to Moldova. Since scientists believe Moldovan society can absorb direct benefits from their activities, they may be more willing to address issues of critical importance to the development of Moldova in their scientific and research endeavours. One researcher living in France said:

I believe Moldovan scientists have a great deal to contribute in the form of collaboration projects between scientists in Moldova and counterparts in Europe.

Other Moldovans pointed out the value of transnational cooperation:

People should see what we make in the West. What cannot be done in Moldova may be done in European institutions; [but] to achieve a common thing we need to work together.

Moldovan scientists think that knowledge transfer and the implementation of cooperation activities is difficult because of the lack of funding and scarce recognition of skilled Moldovans abroad, insufficient infrastructure in Moldova for host projects and a lack of time to undertake transnational cooperation. The difference in terms of working conditions and responsibilities is another barrier to cooperation with scientists based in Moldova. One researcher said:

Scientists who have settled in richer countries are available for various projects because their situation is different from those following a scientific career in Moldova. Here more time is devoted to research than in Moldova where teaching absorbs a great part of their time.

Whilst the incidence of cooperation projects implemented is higher for scientists and researchers than for students and professionals, the readiness to collaborate and contribute to Moldova's advancement was apparent across the three groups. Most Moldovans (86% or 151 persons) believe they can play an important role in the socio-economic advancement of Moldova and they are interested in getting

Table 1. Transnational cooperation actions of skilled Moldovans abroad.

Knowledge sharing

Joint participation in seminars and/or international conferences
 Sharing scientific knowledge and information with colleagues working in the same area
 Better understanding of Moldovan problems through PhD topics chosen
 Publication of scientific work in Moldova
 Providing technical advice on key development issues
 Information on scholarship opportunities abroad

Joint research

Involvement of Moldovan partners in international research projects
 Joint publications in collaboration with Moldovan scientists
 Helping Moldovan scientists to submit proposals for international research grants

Academic exchange

Temporary visits to research centres and universities
 Sharing support materials for university courses
 Giving lectures in Moldova
 Co-mentoring Moldovan PhD students
 Participation in the creation of academic programmes and syllabus design

Investment and business

Investment promotion projects

Other

Interventions in public administration reform

Source: ASM–EPFL survey of the Moldovan scientific diaspora (2011–2012).

involved in specific initiatives such as temporary visits, joint research projects, public policy advice, technology transfer and investment promotion. A Moldovan respondent working in France mentioned:

I am open to participating in any projects that are linked to Moldova's development that might help improve its situation.

Table 1 shows examples of transnational cooperation actions carried out by skilled Moldovans abroad.

Future plans and perceptions of enabling conditions

Migration projects are related to perceptions of the opportunities offered. The future plans of Moldovans depend on the options they feel both host countries and Moldova will offer them to accomplish their projects. Our study therefore also sheds light on the plans of migrant Moldovans to return in the future. We found that students are the most likely to return to Moldova (47%), followed by scientists and researchers (35%) and finally by professionals (28%). Whilst their return intentions are related to their perceptions of opportunities available such as professional and private prospects, their interest to contribute to Moldova's socio-economic development is the most important reason to plan a return, with the desire to be with family and friends the second most important.

We also asked skilled Moldovans about their plans for the next five years. We find that 60% plan to stay in their current host country, whilst 16% plan to move to a third country and 10% plan to return to Moldova. There were interesting differences in terms of profile. Scientists and researchers have the highest share (14%) amongst respondents planning to return to Moldova, followed by students (12%) and professionals (6%). Whilst 72% of scientists and researchers and 60% of professionals plan to stay in their current host country, only 40% of students intend to do so. We can also see that students are more uncertain about their short-term future plans than scientists and professionals in paid employment. This is probably because they are younger and without family responsibilities, but also because their stay in host countries is shorter and their situation less stable than the other two groups; yet they appear to be more open to opportunities. The discussion indicates that Moldovan students abroad do not limit their migratory plans to specific time frames or places, but rather they follow a strategy where their options are kept deliberately open. Migrants' deliberate hesitation is significant when they are uncertain about the chances that the future will offer them. Accordingly, we might conclude that the mobility behaviour of international students changes according to the opportunities available and perceptions of the environments in the host and home countries, as well as in third countries. The intentions of students to return and those actually doing so may increase if they believe Moldova can offer them a safe and trustful environment with a specific career and future prospects.

Moldovans who do not intend to return remain sceptical of Moldova being able to offer them such prospects. They think the situation of poor scientific and career options, a low quality of life, and political and socio-economic instability will not change soon and so they feel a brighter future awaits them elsewhere. Whilst students have more trust in job opportunities that may be offered, scientists rate

scientific advancement options in Moldova more highly. In overall terms, skilled Moldovans are willing to contribute to Moldova's progress, but are discouraged by the attitude of the Moldovan government, which they feel is not interested in engaging them in development efforts, and also by the hostility of Moldovan society towards scientists abroad. Despite negative perceptions of the home-country environment, transnational cooperation of Moldovan scientists is expected to rise in the years to come. There are several reasons for this. Firstly, the institutional programmes and specific brain gain policies of the Moldovan government have encouraged transnational collaboration and other forms of interaction between emigrated scientists and the national scientific community in recent years, and further incentives are expected. Secondly, recognition and visibility of the capacities of Moldovan scientists abroad are increasing. Thirdly, new opportunities for international collaborations are boosted by Moldova's recent association with the EU FP7 Programme.

As part of the enabling environment, adequate policies are perceived as crucial both for encouraging bottom-up transnational collaboration initiatives from the diaspora, and in the form of top-down incentive programmes. We can observe that Moldovans know very little about the existence of institutional programmes that the government has recently implemented to engage skilled Moldovans abroad.⁸ The main reasons for not participating include a lack of interest in supporting the government and a distrust of these initiatives. A US-based researcher said:

I am very interested in participating, but the majority of these programmes are not advertised properly.

The discussion indicates that whilst top-down policies implemented by the government include valuable programmes, the scientific diaspora appears to lack ownership of these initiatives and this is necessary to boost bottom-up practices.

Conclusions

Today, Moldova is undergoing a series of important reforms aimed at advancing economic growth and poverty reduction. These include a specific strategy to boost science, research and innovation, encourage international cooperation and acknowledge the role of the scientific diaspora in helping the country strengthen its competitiveness. The situation leads us to believe that the country's committed support for specific policies boosting linkages with the diaspora is based on two complementary points. Firstly, recognition of the potential gains the home country can obtain from collaboration with Moldovan scientists abroad, which goes beyond the general advantages of research collaboration; for example, through temporary visits or circular migration that might lead to a permanent return, or through engagement in policy design or the promotion of entrepreneurial activities and investments. Secondly, the belief that the Moldovan national system of science, research and innovation is sufficiently adequate and capable of benefitting from international scientific collaboration.

The objective of this study was not to magnify the role of scientists and skilled professionals abroad in the development of their home country. Rather, our interest was to provide an evidence-based analysis of opportunities and challenges for skilled migrants' transnationalism, which might contribute to advancing academic discussion on the development impact of migration and make some specific

recommendations for Moldova. The evidence shows that although skilled Moldovans abroad do have the motivation and potential to benefit the home country through collaboration with the scientific and professional community in Moldova, this can only be accomplished if adequate conditions are put in place and maintained over time. The evidence gathered indicates that skilled Moldovans will continue to emigrate, but it also shows that return skilled migration could occur. However, if economic and political conditions in Moldova remain unclear, it could happen that migrants intending to return might decide to settle abroad and maintain their transnational ties. Likewise, return results in the transfer of skills and knowledge only when returning human capital can be utilized in the home country. Therefore, the country's structural situation must improve significantly and adequate policies need to be put in place.

A number of specific policy recommendations drawn from this study could help. First of all, since the collective actions of the skilled Moldovans abroad are still weak, notwithstanding early signs of an evolution towards better cohesion, there is a need to recognize them as an important asset and to promote their associative activities, supported by well-advertised diaspora policies. Secondly, a suitable environment to validate the knowledge and resources transferred within the local socio-economic context needs to be secured, and this should include political stability and governability. Thirdly, both the sustained return and a continuous enhancement of diasporas' transnational cooperation need to be secured through improvements to the local structural situation. Such improvements include a systematic institutional commitment to science and education; the creation of conditions to guarantee good employment opportunities and access to resources and infrastructure; ensuring coherence between higher education programmes and labour market needs; enabling the transfer of skills gained abroad upon return (ensuring jobs–qualifications matching); and making sure the transferred scientific research and knowledge can become useful to local society. For this, cooperation with key national and international actors is necessary in order to create appropriate environments to trigger brain gain for Moldova.

Notes

1. National Statistics Office, 3 May 2012, <http://www.statistica.md/newsview.php?l=ro&id-c=168&id=3744> (accessed November 7, 2012).
2. During recent years, IOM-Moldova has been an important player in moving forward the debate on migration and development in the country, including highlighting the role of diasporas, as well as in pushing this issue on the national agenda, for which concrete policies have now been designed and adopted.
3. The project was carried out through a collaboration agreement between the ASM and the Ecole Polytechnique Fédérale de Lausanne (EPFL) between 2010 and 2012 and it was financed by the SCOPES Programme of the Swiss National Science Foundation and the Swiss Agency for Development and Cooperation.
4. See also the paper by Cela, Fokkema, and Ambrosetti (2013) in this issue.
5. This study is based on the ASM–EPFL research project, which sought to advance knowledge on Moldovan scientists and skilled professionals abroad and thereby provide specific policy recommendations about how to benefit from collaboration opportunities with the Moldovan scientific community.
6. The sampling strategy and the lower than hoped-for response rate to that expected indicate that a response bias could influence the findings, such as an over-representation of respondents interested in development or those who are professionally well established abroad. In this sense, the possible positive effects of migration might be exaggerated. Therefore, we should try not to place too much trust in the extent to which the findings

of the survey can be generalized. However, this first attempt to identify skilled Moldovans abroad will help in extracting general trends and opening new paths for future research. Furthermore, the methodology and research tools will be useful for additional studies of a similar nature.

7. We collected responses from 36 students, 41 scientists and researchers employed in a research or academic institution, and 88 professionals in paid employment or self-employed.
8. Examples are the IOM-ASM temporary return programme, the creation of the council of scientists of Moldovans abroad, the PARE 1+1 programme promoting an entrepreneurial use of remittances, and the Moldovan Diaspora Congress.

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