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Brain Drain – Brain Circulation or …What Else Happens or Should Happen to the Brains Some Aspects of Qualified Person Mobility/Migration

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Abstract

The article provides a general introductory overview of the (spatial) mobility of highly skilled/qualified persons and discusses the different terms of the mobility of the Highly Skilled, especially those of scientists. It outlines theoretical and empirical aspects of these movements and delineates the drain of European talent to the U.S., especially the outflow of scientists and researchers who contribute considerably to the U.S. innovation system. Further, it takes a closer look at outward mobility in the former socialist countries in Europe, especially in South Eastern Europe, in the period before and after the fall of the Iron Curtain. Finally, the article outlines general policy options in dealing with the mobility of the Highly Qualified.

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Key words: Skilled Mobility, Highly Skilled/Highly Qualified, Brain Drain, Brain Circulation, Brain Exchange, Brain Gain, Brain Overflow, Brain Waste, Talent Flow, Brain Overflow, Transnational Mobility, R&D-sector, U.S. Innovation System, Options

1 From Brain Drain to Other Forms of Elite Mobility

In contrast to "mass migration", the mobility of Highly Skilled[1] or Highly Qualified (HQ) persons has for a long time attracted comparatively little attention from researchers. Currently, however, it is a hip topic and piques the interest of many researchers. The aim of this paper is to outline what happens to Brains and what should happen to Brains on a general level with regard to the mobility of HQ and researchers from post-communist transition countries in Europe. This involves

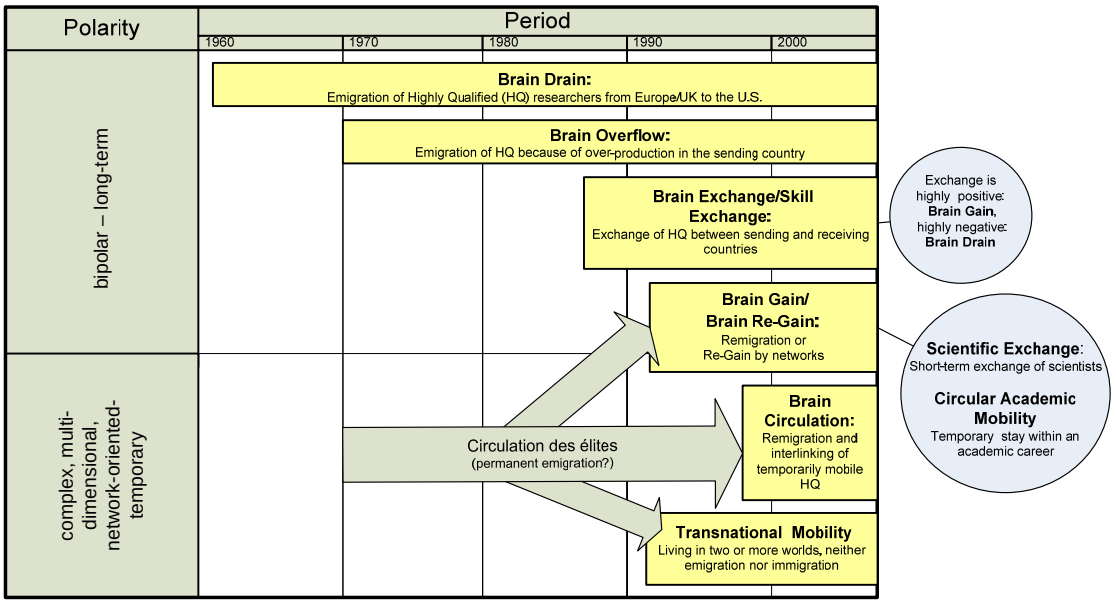
- sketching the development of the discussion dealing with the mobility of HQ in general, especially with regard to the debate on different forms of movements which has resulted in different terms and theoretical considerations
- presenting some statistical data about the mobility of HQ from the selected[2] former socialist countries in Europe
- discussing some policy options to be considered in the context with Brains.

The recent debate on the Mobility of Experts started in 1963, when a report by the British Royal Society complained about the emigration of British scientists and HQ to the United States (Brunotte et al., 2001:201). This outflow of Skilled Persons was labeled "*Brain Drain".* The discussion of the topic since then has brought about an expansion and differentiation of the terms used in connection with the Mobile Elite which is summarized in Figure 1.

1 In the literature Highly Skilled and Highly Qualified are often regarded as identical (Liebig, 2004:8). As skills are hard to define, most authors use the definition of the Canberra Manual that HQ are people with tertiary education attained in the sending country.

2 The composition of countries differs depending on the availability of data.

Figure 1: Development of important terms in connection with HQ mobility



Source: Own Design[3]

Since its coining in 1963, the term *Brain Drain* has been used to refer to the drain of scientists from Europe to the United States. At the end of the 1960s the related debate reached other European countries (Morenz 1968, Chorafas 1968, cited by Beuchtemann 2001:6), where similar complaints were stated. Also Austrian researchers added their opinions on the topic (Schlag 1961, Nowotny and Knorr 1972, Schmiedeck 1973). In the early 1970s it was realized that the Brain Drain from developing countries was much higher than from Europe, and consequently the research focus shifted to the Third World (Watanabe 1969, Visaria 1974, Ward 1975, Zahlan 1977, cited by Mundende 1989:185; Portes 1976:489; Oteiza 1971, cited by Cheng and Yang 1998:628), also in the German-speaking research community (for instance Schipulle 1973, Galinski 1986, Over and Winkler 1989). Since then, the majority of Brain Drain studies has focused on the world's poorest countries. However, these older Brain Drain studies have rather anecdotal character and lack empirical evidence. In addition, the theoretical foundations of this research have also been quite poor (cf. Cheng and Yang 1998:628). In most cases, migration of the HQ is seen as a balance of mechanical forces. Brain Drain mostly is considered as a permanent emigration from poor countries to rich countries, with positive economic effects for the receiving and negative effects for the sending country (Appleyard 1989, Baghwati 1976, Hamada and Bhagwati 1976 and Partington, Baghwati and Wilson 1989). As a consequence, it is argued, measures should be taken to prevent outward mobility of talent from poor countries (Baghwati and Partington 1976). In contrast to Brain Drain, the geographer Allan Findlay (1990, 1993) defined the term *Brain Exchange* as a form of spatial exchange of HQ between developed countries. For Salt (1997, cited by Casey et al. 2001:12), Brain Exchange is a balanced exchange of HQ. If the bottom line is unidirectionally negative for the sending country it is called *Brain Drain*, if it is unidirectionally positive for the receiving country it is called *Brain Gain (see Figure 1).*

3 Design based on Baldwin (1970:359); Findlay, (1973); Lowell et. al. (2004:6); Glebe and White (2001:41); Hillmann and Rudolph (1997:245/359); Johnson and Regets, (1998:4/41); Ladame (1970:39); Logan (1999:437); Pries (1997:15); Scheibelhofer (2005:119); Laudel (2005:381); Docquier u. Marfouk (2005:3-4); Moguérou (2006:7-8); de Haas (2006:10).

Brain Overflow, introduced into the debate by Baldwin (1970), is another early mechanical term associated with talent mobility. Brain Overflow means an over-production of HQ in a country due to the fact that the labor market cannot absorb all its talent. As a consequence, HQ are forced to leave the country. Brain Overflow has become manifest as a form of expert mobility especially from the former socialist countries of CEE (Central and Eastern Europe) and SEE (South Eastern Europe)[4]. There the R&D sector was oversized compared to the competitiveness of the economies, which caused a transfer of R&D staff to the private business sector *("Internal or Horizontal Brain Drain"*) or led to an outflow to the West (Tinguy and Wenden 1993:34).

One of the first to have second thoughts on the emigration of experts being permanent was Ladame, who created the term *Circulation des élites* (Ladame 1970:39ff) in order to demonstrate – without profound empirical evidence – that many HQ return to the home country.[5] Later scientists referred to this concept (e.g. Gould 1988:381ff). Johnson and Regets (1998:4) added the respective evidence in the empirical research on the returning[6] of Taiwanese and South Korean researchers from the U.S. and introduced the term *Brain Circulation.* In the meantime Brain Circulation has come to be seen as a highly favorable form of mobility:

> *"Brain circulation (...) is presumably a positive form of mobility involving scientists and researchers (as well as other highly skilled professionals) moving in and out of different geographic regions, and hence increasing the diffusion of knowledge. The notion of brain circulation has originated from research focused mostly on research students and scientists from developing countries staying in the US" (Casey, et al. 2001:13)*

According to Iredale (2005:227), Brain Circulation is the 3rd and last phase of the *Migration Transition* for countries. Phase 1: Brain Drain (occurs mainly in Developing and Newly Industrialized Countries): Countries are sending HQ (e.g. Bangladesh); Phase 2: Brain Drain and beginning remigration (e.g. Vietnam and China); Phase 3: Brain Circulation: emigration, immigration and Brain Circulation as the highest form of integration in the globalized world (e.g. Taiwan).

Another important term in connection with brain mobility – especially with HQ from former socialist countries – is *Internal (Horizontal) Brain Drain*. This form of mobility occurs when researchers move away from the R&D sector to other sectors like the business sector because of a bad working environment and low salaries. This is a striking issue in the countries in transition with emerging economies, as the people concerned are often the most skilled ones (Devai et. al. 2002:13). *Brain Waste*, then, occurs when "*skilled workers migrate into forms of employment not requiring the application of the skills and experience applied in the former job*" (Casey et al., 2001: 12). If Brain Waste happens in the home country, this is *Internal Brain Waste*; if migrants suffer from dequalification abroad, this is *External Brain Waste*. According to Sretenova (2003:20), this is an alternative to Brain Overflow particularly in the countries in transition. In general, it must be stated that only little research has been done on the Brain Waste issue (Özden 2006:227) despite the fact that Brain Waste is a striking issue for many migrants from SEE and CEE. A maybe lesser form of Brain Waste is *Frozen Brain*, when HQ cannot use their abilities and qualifications to the extent they have been educated and would want.

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4 According to NSF data, in Romania 21,841 students earned a doctoral degree in 2002, which is nearly as high as the German output (23,043), and higher than the Russian output of 18,274 (NSF 2006: Appendix table, 2-40) although the population of Romania is just one fourth of Germany and one seventh of Russia.

5 Later empirical research showed that this is especially true for French researchers (see below).

6 According to Logan (1999:442) the retrieval of scientists back to their home country was first noted in Asia in 1992/93 under the term Reverse Brain Drain. Later the term Brain Re-Gain was used (Gaillard u. Gaillard 1998). Between 1978 and 2003 about 700,000 Chinese students did their entire studies abroad, of which about 170,000 have returned (Saxenian 2003), especially to Shanghai (Müller 2005:252).

2 Data and Theories

Although in the meantime much research has been done on the mobility of HQ, up to this day there is clear evidence of a lack of profound data (Iredale 1999:89, Regets 2001:6-7, Docquier u. Marfouk 2006:187) as well as of theories.

2.1 Theories

Iredale states: "The current state of theory in relation to highly skilled migration is far from adequate in terms of explaining what is occurring at the high skill end of the migration spectrum" (Iredale 2001:7). As it is not the aim of this paper to focus on theories regarding HQ mobility, a brief survey shall sketch the situation.

Most approaches – if they have any theoretical foundation at all – base the mobility of HQ on general migration theories. *Neoclassical models* see migration as a form of investment in human capital in order to *maximize* profit. If the expected profit (in relation to the migration costs) is higher abroad, people tend to migrate (Borjas 1989:461). The higher the level of qualification and education, the lower the relative cost of migration and the higher the expected gains and thus the probability of migration (Krieger 2004, Annex 2:91). According to the *New Economics of Labour Migration (NELM),* migration is not an individual decision, families and households have the possibility to diversify the risk (Stark and Taylor 1989, Taylor 1992, Taylor 1999, Stark 2004, Taylor 2003, Stark and Fan 2006). They send those people abroad who have the best chances to *optimize* their income. Consequently, return migration is possible, if the HQ have reached the economic optimum (not maximum). NELM determines a positive relation between mobility and remittances, but it is still not clear whether the highly skilled contribute more than the unskilled in absolute and relative terms (Docquier 2006:19). Also the effects of remittances on long-term economic development are still poorly understood (Kapur and McHale 2005:161). At any rate, NELM has had a positive impact on the Brain Drain debate (de Haas 2006:11).

The main shortcoming of the purely economic perspective is that other factors causing mobility are rarely considered. According to Massey (2000:59/69), exclusively economy-based concepts for example cannot explain why comparatively low migrant rates may exist although the income differences between the countries are striking.

Some theoretical concepts see the movements of the HQ in the context of globalization as a consequence of world-wide skill shortages (Salt 2003:34). It is supposed that the main driving factor are multinational firms allocating their HQ needs. From the HQs' perspective, movements can be seen as investments in human capital to boost their careers (Wolter and Straubhaar 1997:11). In this interrelation Findlay and Garrick (1990) and Findlay and Li (1998) focus on the role of *Migration Channels* (amongst others: internal labour market of transnational enterprises, head hunters).[7] Migration streams are channelled by Intermediary Agencies (Findlay and Li 1998:682). Pethe (2006) has tested this approach in relation to the Green Card Regulation and found out that the individual search via the Internet is a more crucial factor than the channels.

When we regard globalization as a state of cross-linking of the world, we can consider migration as a form of building networks. Here the spectrum ranges from the renewed and HQ-adapted macro-oriented *World System Theory*, which divides the world in centre and periphery, with an dependence of the poor from the rich countries. According to Cheng and Yang (1998:638ff), "Westernization" and in detail "Economic Interdependency" and "Educational Articulation" are the main factors for HQ to emigrate from poor to rich countries. A key issue is the Americanization of the education systems

7 Some of these channels are sketched by Nikolina Sretenova in this issue.

worldwide, which affects also Europe (Prisching 2005:22-30) and especially the former socialist countries in CEE and SEE.

On the mesolevel, the *Migration System Approach* may be relevant for reflections on the mobility of HQ as far as the linkages between countries of origin and target countries are concerned. On a microlevel, Hoffmann-Nowotny (1973:11ff) states that migration functions as pressure balance for individuals. People balance the strain by migrating to places where they can get more prestige and power. This is an approach that can be linked very closely to the mobility of researchers and scientists (see below). The *Ethnic-network approach* has some relevance for HQ as ethnic diaspora "reflects more accurately the flexibility, mobility, and complexity of migrants' experiences than features of a fixed homeland as the place of origin and the source of continuous cultural enrichment" (Li 2005:25). Nevertheless empirical findings are rare. Saxenian (2002, 2006) has outlined in studies about the Silicon Valley that ethnic networks of Indian and Chinese HQ have contributed to a high extent not only to the innovation system in this region, but in connection with the return migrants ("Argonauts") also to the High Tech clusters in the sending countries. In other contexts, however, this could have less relevance. A recent study by Liebig (2004) shows that ethnic networks are less important for the skilled than for the unskilled, because the former are more flexible and not dependent on people of the same nation (Liebig 2004:11). In their research on the mobility of HQ from CEE, Kaczmarczyk u. Olkóski (2005:19) have reached similar conclusions.

The theories of *Social Capital* and *Social Networks* (Bourdieu and Wacqunat 1992:119, Faist 1997:69, Portes 1998, Massey and Zenteno 1999:5328ff) can also be regarded as fruitful concepts in the context of HQ. Emigrated HQs may serve as *Bridge Heads* for other potential migrants and may boost mobility from the sending countries and create linkages and networks that induce better development in the sending countries (Fromhold-Eisebith 2002). Network approaches can be seen in the recent concepts in dealing with the emigration of HQ. One of these is the *Diaspora Approach* (Kaplan 1997, Kaplan et al. 1999, Meyer et al. 2001, Meyer 2001, Meyer 2003), which will be discussed verbatim below. In essence, these scholars argue that in contrast to the linear perspective of the human capital approach, the full potential of a person can only be tapped in a network of contacts with other persons. Linkages with HQ in the diaspora can be used very creatively in several forms which will be discussed below.

One of the striking recent paradigms of migration research is the concept of *Transnational Mobility.* This theory was developed by a U.S. group of anthropologists around Glick-Schiller. They depart from the classical definition of migration (in the sense that migration is a move from a sending country to a receiving country) to an oscillation between different spaces (see Figure 1). This mode of living constructs hybrid identities, people live in at least two worlds, they lead "double lives" (Portes 1997:812) on several levels: they speak two languages, construct socio-cultural realities beyond one nationality and create *Transnational Spaces*, which Faist defines as "relatively stable, lasting and dense sets of ties reaching beyond and across the borders of sovereign states. They consist of combinations of ties and their contents, position in networks and organisations, and networks of organisations that cut across the borders of at least two nation-states" (2004:3-4).This means a turn away from the concept of nations as natural containers from and to which people move. This new form of mobility, which possibly is best adapted to the challenges of globalization, also poses a big challenge for the methodological approach. Therefore empirical findings are rare (Castels 2002:1158, Scheuringer 2006:25), but they do exist (e.g. Fassmann 2003, Pries 1997:32-44, Fromhold-Eisebith 2002:39, Fürstenberg 2006:22). The conclusion that HQ have to be affected far more than the "mobile masses" can be deduced theoretically (Aschauer 2006:270). Scheibelhofer (2005:130) has found transmobile forms of living among Austrian scientists in the U.S. beside permanent emigration and temporary migration.

Bar these new network approaches, a change in perspectives on the effects of Brain Drain has taken place: some scholars realize that sending HQ abroad can also have positive economic and social effects for the sending countries (Cheng and Yang 1998:626, Stark and Fan 2006:16). Sending countries can profit from "feedback effects," such as remittances[8], from transfer of technology and from investments by the elite abroad in the countries of origin. Khadria therefore uses the term *"Beneficial Brain Drain"*. Another effect of elite emigration may be the indirect stimulation of investment into the higher education sector at home. When the return on human capital investment is higher abroad than at home, people at home are motivated to invest more capital in their education, which can lead to further investment in education at home generally and so boost the economic growth in the sending countries (Docquier and Marfouk 2005:3). Recent studies show that, after having acquired specific and additional knowledge abroad, returning migrants can contribute significantly to the development of the sending country, and get ahead at home. This is valid not only for long-term stays. Also short-term visits abroad can enhance the career of the mobile HQ. Williams and Baláz (2005:465) have demonstrated this in a study with Slovak experts, and explain it with the acquisition of informal human capital (in the sense of Polany`s *Tacit Knowledge*).

One reason for the scarcity of theoretical foundations mentioned above may be found in the – in contrast to "mass migration" – late start of the discussion as well as in the fact that HQ were long regarded and treated as a homogenous group with a strong bias towards managers in transnational firms and the dotcom companies of the ICT sector (Kofman 2003:55). In the meantime it has become clear that the analysis of mobility must consider the different types of HQ (King 2002:89, Todisco 2003:27ff, Pethe 2005:264). A differentiation is provided by Mahroum (see Figure 2).

According to Mahroum, different groups of HQ are spurned on by various types of push factors and are concerned with different types of policies. The mobility of Managers and Executives is driven by benefits and remuneration. Engineers and Technicians are encouraged by economic factors. These groups were extensively researched by British geographers in the 1980s and 1990s. Other groups, like scientists (although they were at the core at the beginning of the debate) or students, were neglected for a long time (Williams and Baláz 2005:439). Especially students as "semi-finished human capital" (Khadria 2002:52) have recently become the focus of attention for many scholars (e.g. King and Ruiz-Gelices 2002:229, cf. also OECD 2004:20ff) because they seem the most underestimated group among HQ (Alberts and Hazen 2005:134, King 2002:98-99,) due to the fact that in 2006, 2.5 million students were enrolled in foreign countries.[9]

8 Ratha (2005, cited by Özden and Schiff, 2006:1) puts world-wide remittances for 2004 at US$ 216bn, of which around US% 150bn, that is approx. 70%, went back to Developing Countries. In 2001, remittances from citizens outside of Bosnia-Herzegovina amounted to approx. 17%, for Serbia/Montenegro to 12.8% of GNP: http://www.gtz.de/migration-and-development/konferenz-2/deutsch/überweisungen.html (7.1.2007). Remittances from Bulgarians abroad made up 2.1% of the GDP in 2001, which was higher than FDI in the same year (Markova 2004:12). Details about remittances in the context of HQ: Cinar and Docquier (2004). According to the ILO 2003 (cit. by OECD 2004:277), remittances of HQ in the case of Asian developing countries are lower than those of the less qualified. For a survey of the connection between remittances and development see Gosh (2005:178-179).

9 Institute for International Education (2007): http://www.atlas.iienetwork.org/?p=48027. More than half of all students are concentrated in four receiving countries: the U.S. (22%), the UK (12%), Germany (10%) and France (10%).

Figure 2: Classification of HQ mobility and types of influencing factors

Group	Type of push & pull factors	Type of policies
Managers & Executives	Benefits and remuneration	Business-oriented
Engineers & Technicians	Economic factors (supply and demand mechanisms)	Immigration legislation Income tax
Academics & Scientists	Bottom-up developments in science Nature & conditions of work Institutional prestige	Inter-institutional and intergovernmental policies
Entrepreneurs	Governmental (visa, taxation, protection, etc.) policies Financial facilities Bureaucratic efficiency	Governmental and regional policies Immigration legislation
Students	Recognition of a global workplace Accessibility problems at home Inter-cultural experience	Intergovernmental and inter-institutional policies Immigration legislation

Source: Mahroum (1999:180).

For Florida (2004:128), student mobility is the leading indicator for globalization par excellence. Due to the fact that the tendency to stay abroad forever correlates negatively with age, the danger of permanent emigration (Constant and Massey 2002:8) is highest among this group. Unlike managers and executives, entrepreneurs, engineers and technicians, students as well as academics are concerned with inter-institutional and intergovernmental policies (Mahroum 1999:180). Examples are different programs of the EU that influence the spatial streams to a high extent.

But even if Brain Drain is discussed with regard to different types of groups, it is still not clear *who* leaves (and returns) among these groups. Is it the "best and brightest" among the skilled who tend disproportionately to emigrate? Empirical evidence on that question is scarce, but some studies, e.g. on Indian immigrants to the U.S., support this theory (Kapur and McHale 2005:21ff). Concerning the "quality" of the returnees, the limited literature suggests in the cases of Denmark and Norway that the least successful emigrants as measured by earnings and labor market attachment tend to return (Husted et al. 2001, Edin et al. 2001, Longva 2001 cit. by Kapur and McHale 2005:171).

A Special Case? The Scientific Community – Researcher Mobility

Most scholars tend to think that the spatial movements of scientists constitute a special case. Mobility and interaction between scientists are considered to be constitutional for the production and transfer of knowledge within the Scientific Community *par excellence* (Haraway 1988:172ff, Livingstone 1995:5ff; Gregory 2000:297f; Jöns 2002:64, Mahroum 2000:367, Lanciano-Morandat and Hiroatsu 2003:21-22, Harris 1998; Meusburger 1998:150). Mobility creates contacts and knowledge transfer within the scientific networks. Due to this inherent factor, migration is just one form of scientific mobility (see also Figure 1).

In the 21st century, leaving one's home institution for a shorter or longer period has become a key requirement for advancement in a researcher's career *("Circulary Academic Mobility",* Jöns 2002:47, Jöns 2005:10), all the more so since "in-house appointments" and "faculty inbreeding" are increasingly frowned upon. In the scientific context, there is a distinctive difference between the Centres of Scientific Activities and the Periphery or Semi-Periphery on different levels (Frackmann 2005:1, Laudel 2005:380). Outstanding scientists usually attract the most talented students and

researchers. According to Mahroum (2000:371, 1999:180), the prestige of these persons and institutions is one of the most striking pull-factors for the mobility of academics.[10] Although it must be taken into consideration that the number of researchers worldwide is quite small[11], the concentration of researchers, especially top researchers, in Scientific Hotspots is striking. They go to places and spaces where they find centres of excellence with the best equipment, the best research funding and better salaries. Zucker and Darby (2006) have shown that scientific stars are attracted by places with other stars already working there, and consequently over time the stars concentrate in only a small number of places.

Talent Flow from Europe to the United States

These places, and consequently the leading research institutions which represent the core/centre of the world's innovation system, are mainly located in the United States, which are still very attractive for the European scientific elite. The export of talented European HQ has increased in the past few years (Mahroum 1998:17, 1999:5) so that currently more than 400,000 researchers from Europe are working in the U.S., which is about 40% of all foreign scientists (Groom 2004:16). About one quarter of all full professors at U.S. universities come from Europe, and in the fast-growing area of Postdoctoral Scholars ("Postdocs") the percentage of European scholars has climbed to over 50% in some disciplines (Beuchtemann 2001:29, NSF 2006).

The *"tremendous influx of talented immigrants"* (Florida 2004:124)is the most determining factor behind the dominance of the U.S. innovation system. Foreigners contribute to an enormous extent to the U.S. innovation systems. In the 1990s, about 60% of the most frequently cited physics papers by "U.S.-based authors" were in fact written by immigrants (The Economist, 21.8.1999:24). In the ranking of foreign contributors, the leading countries are European: first Germany, second Great Britain, and Austria is still in the Top 6 (Levin and Stephan 2001:114-115) .

The problem is not only the quantity, but also the quality of highly qualified migrants. Beuchtemann (2001:5) speaks of a *"Crème-de-la-crème effect":* on the one hand European talents have to pass a rigorous preselection process throughout the European scholarship system (only the best who meet the quality criteria for financial support can go), on the other hand precisely those talents tend to move who want to work in future-oriented new fields, who in Europe rarely have the chance to develop. Both groups, especially the very best researchers, tend to remain in the U.S. The major pull factors of the U.S. universities (see Table 1) are supplemented by the fact that the BTA (Been to America) factor is becoming more and more a necessity in a researcher's career (Scheibelhofer 2005:121) due to the fact that also in Europe many appointed professors are scientists who have returned from the United States. These persons tend to prefer researchers on their teams who have a similar biographical background (Beuchtemann 2001:74).

10 We query whether "prestige" is the unique proposition among the class of HQ. We assume a bias which comes from the fact that scientists investigate the spatial movements of scientists. They may imply "higher" non-economic motives for being mobile in demarcation to other HQ. It can also be supposed that "prestige" is a strong pull-factor for managers entering international companies, especially consulting firms. The most renowned firms are also attractive because of the prestige which can be generated by working some years in these enterprises. It is well known that consulting firms do not pay young potentials too much at the beginning of their careers, because they and the applicants know that these jobs will enrich the applicant's personal CV and lead to higher incomes later.

11 According to the OECD (2005, Tab.B 10.1), 5,065,567 (in full-time equivalent) were registered worldwide in 2000, 3,380,903 thereof in OECD countries, 1,683,664 in non-OECD countries (without Africa, except RSA and some countries in Latin America).

Table 1: Major pull factors of U.S. universities

- Open-minded society
- Prestigious first-rate universities
- Less hierarchy, less bureaucracy
- Smaller working groups
- Greater interdisciplinarity and better cooperation among researchers
- ”Relatively relaxed immigration policies“
- Fair contest between scientists and universities
- No ”faculty insider breeding”
- Better working conditions (e.g. funding)
- Increased scientific visibility
- Provides BTA (Been to America) factor

Source: Own design based on Beuchtemann 2001:72ff, Chan 2001:78

According to Finn (2003:2), 75% of foreign doctorate earners of the year 1999 had stayed until 2001. Especially Chinese and Indian doctorate earners tend to stay permanently. Within Europe, people from the post-communist countries have the highest stay persistence: 77% of those who earned a doctorate in 1996 had prolonged their stay up to 2001 (Finn 2003:9). That suggests that talents from these countries are real Brain Drain cases without intention to return. In the EU, the British have the highest rate of not returning (70%), whereas Germans tend to go back (only 25% stay). A recent study by German researchers (Enders and Mugabushaka 2004) shows that eventually 85% of all scientists return. Especially the French (only 7% have stayed in the U.S.) are ultimately homebound (Martinelli 2002:12), though outward mobility among French doctors is immense: 30% of all graduates spent some time after their studies abroad. Obviously France is *the country* in Europe where Brain Circulation really occurs, at least among scientists (Gaillard 2002:231-32). Concerning the drain to the United States, the *quality* issue matters. If really the best researchers go to this scientific stronghold, the return migration process is reduced to the question whether adequate research conditions can be offered (Moguérou 2006:16, Zucker and Darby 2006:7).

Above theories show that HQ mobility is a complex issue which is expressed in the new terms covering these movements. The traditional view of the bipolar models of migration is overlapped by temporary migration and transnational forms of living. It must be added that migration flows, in general and of HQ specifically, are to a high extent controlled and regulated by national and international immigration policies (during the socialist era in the countries in transition also by emigration policies). Bad social, economic and political conditions at home are major push factors, and personal dispositions to be mobile as well as family (and ethnic) networks also play a crucial role. There are many examples of HQ migrating, especially from SEE, in the previous decade because of war and human rights violations, and the observed Brain Drain is in fact a “Forced Migration”. Ultimately, however, mobility is an individual personal decision.

2.2 Brain Drain from Post-Communist Countries in Transition

In 2005, about 190 million people were migrants (international immigrants), which is about 3% of the world's population (Docquier 2006:10). The number of HQ among these people has increased in absolute and relative terms. The number of working foreign-born individuals in the OECD countries increased from 42 million in 1990 to 59 million in 2000. In the same period the number of HQ grew

from 12.4 to 20.4 million (Docquier and Marfouk 2005:16-17). Nevertheless, due to the increasing population and the resulting higher output of skilled persons in the sending countries, the relative Brain Drain stayed stable in this period (Docquier 2006:12).

Beside the migration movements from Asia, emigration from the former Soviet Union and its Satellite States constituted the most important mobility waves in the 1990s. During the 1970s and 1980s, fewer than 100,000 people were able to leave the communist regime behind through the Iron Curtain (Adrittis 1992:6). Emigration was more or less strictly forbidden in most present-day countries in transition. Emigration of HQ and especially of researchers and scientists was an *"either-or decision"* with scarce or restricted return possibilities. With the fall of the Iron Curtain, however, the emigration barrier of the East was replaced by the immigration barrier of the West (Inzelt 2003:1). Adrittis (1992:1) estimates that after 1989-1992 about 2 million people from the East emigrated to the West, among them many HQ. In the following section I will try to sketch some figures about the outward mobility in the post-communist transition countries.

One of the rare statistics about skilled migrants is provided by Docquier and Marfouk (2005, cf. Table 2).[12]. Docquier and Marfouk define skilled migrants as persons with at least tertiary educational attainment, wherever they completed their schooling. Latest available data refer to the year 2000. The place of obtaining the tertiary degree cannot be identified (ibid.:7), which is a shortcoming for studying the Brain Drain, because it is not clear where this human capital investment was originally made. Nevertheless it provides some evidence of the composition of the emigrant stock in relation to the working-age group in the source country. It puts into perspective some pictures of outward mobility. For instance, it shows that the biggest Brain Drain world-wide affects the UK.[13]

Table 2: Stock of Skilled Emigrants, Emigration and Selection Rates in selected countries

	1990				2000			
	Total emigrants (OECD)	Total HQ emigrants (OECD)	Rate of emigration HQ (in %)	Selection rate HQ (in %)	Total emigrants (OECD)	Total HQ emigrants OECD	Rate of emigration HQ (in %)	Selection rate HQ (in %)
Austria	378.954	113.432	16.2	29.9	373.624	130.487	13.5	34.9
Hungary	300,859	115,707	14.4	38.5	318,368	124,426	13.2	39.1
Poland	989,741	308,051	14.4	31.1	1,135,598	449,059	14.1	39.5
Romania	332,689	96,627	9.2	29.1	563,090	176,393	11.8	31.3
Bulgaria	322,993	32,648	3.7	10.1	463,564	75,873	6.6	16.4
Albania	13,598	2,447	2.4	18	150,910	27,835	9	18.4
Moldavia	n.a.	n.a.	n.a.	n.a.	31,979	14,645	3.4	45.8
Macedonia	n.a.	n.a.	n.a.	n.a.	260,672	51,177	29.1	19.6
Serb./Mont.	n.a.	n.a.	n.a.	n.a.	714,609	148,229	13.6	20.7
Croatia	n.a.	n.a.	n.a.	n.a.	479,708	98,342	24.1	20.5
Bosnia/Herzegovina	n.a.	n.a.	n.a.	n.a.	491,023	83,260	23.9	17
Russia	n.d.	n.d.	n.d.	n.d.	565,508	280,059	1.5	51.1
Ukraine	n.d.	n.d.	n.d.	n.d.	743,798	246,218	3.5	33.1

12 Docquier and Marfouk provide estimates of emigration stocks and rates by educational attainment for 195 origin countries in 2000 and 174 countries in 1990. The data on immigrants' educational attainment and country of origin is collected for the OECD countries (ibid.:1).

13 According to these figures (Docquier and Marfouk 2005:Table 4), the most affected countries world-wide in relation to the total highly skilled emigration stock in OECD countries (2000) are 1) the UK (1,441,307), 2) the Philippines (1,126,260), and 3) India (1,037,626). After Mexico, Germany holds 5th place before China. Among the CEE countries, Poland leads in 10th place (449,059, ahead of the U.S.), Russia takes 18th place (289,090), the Ukraine comes 22nd (246,218), Romania 26th (176,398).

Data Source: Docquier and Marfouk (2005), Table .A.1.1-1.Table A.1-2

Notes: "n.a." means "data not available"; rate of emigration: emigration stock compared to the total number of people born in the source country and belonging to the same educational category; selection rate: share of emigrants with tertiary education among total emigrants.

Another remarkable result lies in the fact that in 2000 in absolute terms the emigration of skilled migrants from Russia and the Ukraine was just twice as high as from Austria, in relative terms very low (only 1.5% of Russians and 3.5% of Russian academics are abroad). This puts lamentations about the tremendous outflow of HQ from these countries into perspective. However, with 51.1% the share of emigrants with tertiary education in the total number of emigrants from Russia is the highest among the presented countries in transition. The selection rate is also very high for Moldovia. From the Balkan States, about a quarter of the highly educated went abroad from Croatia, Bosnia Herzegovina and Macedonia. The share of academics among the emigrants is about one fifth, which is lower than in Austria, Hungary and Poland; at the bottom of the table is Albania, where only 17% of the emigrant stock in 2000 had tertiary education.

Alarming are not the absolute figures, but the increase in outflow of HQ in the decade between 1990 and 2000. Whereas the share of HQ among the stock of emigrants in the sending countries was declining in Austria, Hungary, and Poland in 2000, over the same period this figure increased by nearly 30% for Romania, nearly 80% for Bulgaria and grew fourfold for Albania.

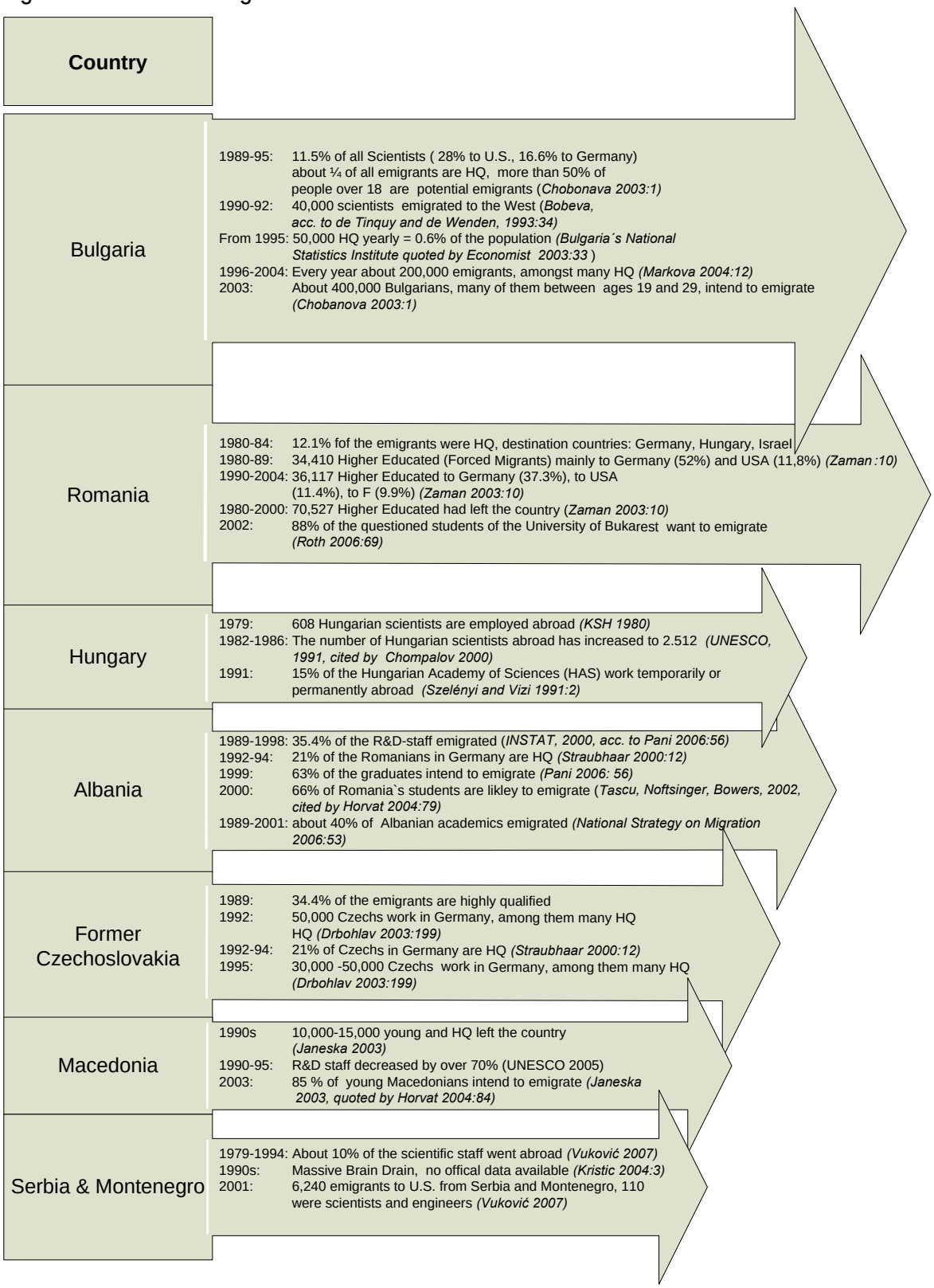
Regarding the category "Eastern Europe", which according to Doquier and Marfouk (2005:33) includes Belarus, Bulgaria, the Czech Republic, Hungary, Moldova, Poland, Romania, Russia, Slovakia, and the Ukraine, it can be stated that about 7.8% of all immigrants to OECD countries are from this region. The share of skilled workers in these sending countries is 17.4%, among the migrants 34.2% (Doquier and Marfouk 2005:Table 3), the migrants are therefore selected in direction HQ. Nevertheless, the percentage of HQ migration from East European countries to OECD countries is lower than that of Western European countries.

Since it is not clear from these statistics where the educational attainment has been achieved, further investigations become necessary. Figure 3 outlines some outcomes of these later publications. The data, mainly referring to researchers and scientists, has to be taken in with a critical look because it differs by author and partly provides only estimates with little statistical background.

As demonstrated in Figure 3, Germany is the second most important target country for East European HQ after the United States, especially for the Polish. In the European context, East-West-migration is a migration from Poland to Germany (Fassmann 2005:12).[14] Germany is also very attractive for the HQ immigrants from other CEE countries. As the percentage of university graduates in Germany was at about 13% between 1992 and 1994, this value was much higher for the immigrants from Russia (27%), Bulgaria (17%), the former ČSSR (21%), Hungary (22%), Bulgaria (17%) and Romania (21%) (Straubhaar and Wolburg 1999, cit. by Straubhaar 2000:12).

14 This stream has increased with regard to the student flows from Poland to Germany. In 1996/97 5,271, in 2000/2001 9,328 and in 2002/03 12,601 people from Poland studied in Germany (winter semester). Thus, the Polish constitute the third-biggest allocation of foreign students in Germany behind the Turkish and the Chinese (Isserstedt and Schnitzer 2005:14-15).

Figure 3: Brain Drain: Figures from the literature – selected countries



Source: Own design on the basis of literature cited; Poland and the former USSR are discussed in the text

Between 1980 and 2000, 70,527 "Higher-Educated" *Romanians* – most of them female – emigrated. The multitude of Forced Migrants during the Ceausescu era was as high as the number of migrants in the following decade. Target country number one was Germany (nearly 50% between 1980-1990), about 12% went to the U.S. (Zaman 2003:10). After 1990 the Brain Drain increased as the number of

tertiary-educated people among the emigrants rose consistently (Baldwin-Edwards 2005:7). Nevertheless Roth (2006:67) claims that apart from permanent emigration circulary forms of mobility should also have increased.

After the implementation of martial law in *Poland* in 1980 (which is not presented in Figure 3), about 76,300 academics, among them 4,000 scientists and 10,000 students, fled to the West (Hryniewicz 1992, cit. by Inzelt 2003:19). Detailed analysis has shown that the Polish scientists had to suffer *Brain Waste*, only 15% of them continued working in academic fields. Between 1981 and 1988 about 700,000 people emigrated, 15% were highly qualified, in the 1990s the percentage of HQ among the emigrants declined (ibid.). According to Kaczmarczyk (2006:14), Poland, from which more than a quarter of the scientific staff left between 1981 and 1991, has increasingly become a case of *Brain Overflow.* A detailed analysis by Hryniewicz et al. (1997, cit. by Kaczmarczyk 2006:14) of the mobility of Polish scientists has shown that the high point of emigration was reached in 1992/93. But during the same period, the maximum threat for the R&D sector came from the movement of scientists to the private business sector, which was five times higher than permanent emigration. Therefore, it stands to reason to assume that the biggest threat to the national R&D sector does not come from *External Brain Drain*, but from *Internal Brain Drain*, as most talented people evade to other, better paid jobs in other sectors of the labor market.

Hungary was nearly completely isolated until the Revolution of 1956, when a large number of students and scientists among the total of 194,000 refugees, mainly from Budapest, left the country. Until 1963 there was no official emigration. In the 1960s the emigration regime became less restrictive and after 1968 academics, scientists and also students were allowed to travel abroad, and some few hundreds were able to use these opportunities, which accelerated their entrance into the international scientific community. The Hungarian elite scientists, especially of the Academy of Sciences – similar to the HQ in Poland and former Yugoslavia – had the clearest picture of the West among communist researchers. In addition, Hungarian researchers – forced to learn a foreign language when leaving the country – had profound knowledge of English, which simplified contacts with the Western Scientific Community. According to NSF-data[15], in 1988 for instance, co-authorship between Hungarian and U.S. researchers created tighter networks than that of Austrian and U.S. authors, although the level of internationalization of Austrian researchers was at that time generally higher than that of Hungarians. Evidence from the literature and the author's investigations suggest that the high point of the Brain Drain wave had been reached by the end of the 1980s and the beginning of the 1990s[16] and that afterwards more and more circulary forms of mobility have taken place. As Hungary was one of the earliest countries to open the market to foreign direct investments, a large number of job possibilities for young academics was created, which is a threat for the public R&D sector, whose salaries are hardly competitive with industry incomes, which encourages Horizontal Brain Drain.

The *former USSR* (which is not presented in Figure 3*)* suffered considerably from the loss of talent after the fall of the Iron Curtain. Supposedly, more than 500,000 researchers emigrated between 1989 and 1991 (De Tinguy and de Wenden 1993:33). In addition, 120,000 scientists, doctors, journalists and artists left the country between 1990 and 1995 (De Tinguy 1995:98). But with regard to Docquier and Marfouk's figures (cf. above), the data seems quite inconsistent. According to other sources, between 1990 and 2000 two thirds of the R&D staff supposedly left research (Ushkalov and Malakha 2001:81). Gokhberg and Nekipovova (2002:182-83) suppose that about one quarter of the 30,000 emigrated scientists work in the U.S., the elite researchers among them. A look at the websites of U.S. universities provides evidence of this fact. According to NSF statistics, in 2003

15 Own Calculation based on NSF (2006): Appendix tables 5-47, 5-48, 5-49.

16 This can be exemplarily stated for the Mathematical Institute of the Hungarian Academy of Sciences (Alfred Rényi Institute).

about 146,600 Russians in the U.S. had an academic degree, 71% thereof had attained this degree abroad (mainly in the former USSR). 80.2% of Russian doctors had attained their doctorate outside the U.S., a figure that is higher than for most other nationalities in the U.S. (NSF 2006, Appendix tables 3-18).[17] In addition, about 120,000 supposedly held a temporary appointment abroad and would therefore have had it easier to return.

A survey by the Ministry of Science and Technical Policy of the Russian Federation in 1994 showed that the reasons for outward mobility primarily lay in push factors such as bad living conditions in Russia in general and low salaries (76% of interviewees). The most significant pull factor was the prestige of the universities abroad (50% of respondents, Ushkalov and Malakha 2001: 81). These results are partly confirmed by a later study among 500 Russian scientists (Krassinets and Tiurikonova 2001:12ff): 50% mentioned economic reasons and only 20% the declining prestige of Russian science as motives for possible emigration. Balancing push and pull factors, these results show that prestige is an important factor for the mobility of scientists, but not the *crucial point for researchers from the periphery and semi-periphery*, where economic reasons are at least striking.

But in contrast to the results some years earlier, only a very small minority of the scientists did not see the solution for their problems in permanent emigration (only 1% of respondents); moreover, they were looking for extra money in various forms of additional occupations in their academic fields.[18]

The population of *Bulgaria* declined from 8.949 million inhabitants in 1985 to 7.761 million inhabitants in 2004 mainly because of emigration (Genov 2006:48). According to Markova (2003:74 and 2004:12)[19] from the Economic Policy Institute of Sofia, between 1996 and 2004 about 200,000 Bulgarians emigrated.Between 1989 and 1995 about 11.5% of all scientists emigrated, of which 87% had been in research, many in the fields of mathematics and information technology (Chobanova 2003:1). Their main target countries were the U.S. (28%), Germany (16.6%), Canada (9%) and the UK (5.7%). Although only 898 Bulgarians studied in the U.S. in 1993, the number increased to 3,270 in 2001 (Chobanova 2003:1). According to a 2003 survey, 93% of the Bulgarian youngsters between 15 and 30 years are open to emigration, 11.6% have a strong intention (Markova 2003:74-75). The reasons in general were bad living conditions; the outcomes of Genov's research (2006:48) show that the tendency to emigrate is strongest among the best educated from Sofia.

Massive Brain Drain can be reported for the *Western Balkan* states, i.e. Albania, Bosnia and Herzegovina, the Former Republic of Yugoslavia, Macedonia and Serbia (Kozmus and Krusic 2005: 23). Most of these countries suffer from the aftermath of the Balkan War, which has hindered transformation, especially in politically unstable Serbia ("Blocked Transformation" until 2000). The war in the 1990s led to a significant increase in Brain Drain and hindered positive development in the R&D sector. According to Drenka Vuković, the main push factors in Serbia are low level of living standard, uncertainty, housing problems, material-technical conditions unfavorable for the scientific work, and lack of scientific information. High salaries, material-technical conditions favorable for the

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17 78.1% of the 6,800 Romanian Master degree holders and 58.8% of the Doctoral degree holders had attained their degree outside the U.S., which is also very high by comparison (Former Yugoslavia: of 2,400 doctorate holders 43% gained the title outside the U.S., NSF 2006, Appendix tables 3-18). Many leading scientists of the Academy of Sciences left during the 1990s, in the field of mathematics about 80% (Leskov 1993:A 25).

18 60% regarded "Supplementary employment in their speciality (lecturing, consulting)" as an adequate strategy, 44% "Active searches for financial resources (grants, contracts)", 26% "Work on a regular basis", 22% "Transfer to a more promising job within the academic field", 20% "Savings, moving to rented housing", 16% "going abroad to work in a temporary job", 8% "Moving to the business sector, finance commerce", 6% "Additional work in a low-skilled job". On the question, "What would you recommend to your younger colleagues?", 23% recommended staying and working in Russia, 27% spending a year abroad, 23% spending several years abroad, and 9% emigrating (Krassinets and Tiurikonova (2001: Tab.6:14).

19 Der Standard, 28./29.2.2004:12.

scientific work, widely available scientific information, possibility of promotion, and stability in the country one is attracted by, are the most important attracting factors.

Beside political reasons, all countries in South East Europe – with the possible exception of Croatia – suffer from the decline of R&D infrastructure, a striking issue which can only be illustrated with some figures here. Concerning R&D intensity, for instance, none of the countries reaches the EU level (about 2%) or Austria's (2.43% in 2006 according to Statistics Austria 2007).

Table 3: R&D intensity (%) in South East Europe (1992, 1997, 2000 and 2003)

	1992	1997	2000	2003
Bulgaria	1.64	0.51	0.52	0.5
Serbia/Montenegro	n.a.	1.28	1.19	0.52
Romania	0.85	0.52	0.37	0.31
FYR of Macedonia	n.a	0.32	0.48	0.18
Croatia	n.a	0.69	1.34	0.75
Bosnia/Herzegovina	n.a	n.a	0.05	0.05

Data notes: R&D expenditure as a proportion of GDP, Bosnia and Herzegovina: no data available for 1997

Source: Gesellschaft zur Förderung der Forschung (Ed.)(2006:16); Kozmus and Krusic (2005:37), European Commission (2003:60)

As table 3 illustrates, the situation differs between the selected countries. As presented in Table 4, other R&D indicators reveal that differentiation is necessary. Whereas in Romania R&D expenditures – although at a low level – are heavily driven by the private business sector, in Bulgaria and especially Serbia and Macedonia further investments are needed all the more. Croatia seems to be in a privileged situation, as its rate of R&D personnel is comparably high (10) and has been growing in the past few years. In other countries under consideration, the number of researchers is still decreasing, although the number of scientists in this region has already halved since 1989 (Kozmus and Krusic 2005:37).

Table 4: R&D figures in selected countries (South East Europe)

	R&D expenditure by business sector as share of total performance in %	R&D personnel per 1,000 labour force (2003)	Total number of researchers (2003)	Growth of the total number of researchers in % (1997-2003)
Romania	58.4	3.3	16,942	-8.6
Croatia	39.1	10	11,464	6.7
Bulgaria	20	5.3	10,976	-4.9
Serbia Montenegro	12	6.7	10,697	-5.3
FYR of Macedonia	1.3	3	1,990	-8.6

Source: Gesellschaft zur Förderung der Forschung 2006:16-18/63/80

No data available for Albania, Bosnia and Herzegovina

No other Central or East European country has been so affected by emigration in the last 15 years as *Albania* (UNDP 2006:3). It is one of the poorest countries in Europe and also suffers from Brain Drain which is "acquiring more and more the features of a long-term or permanent emigration, simultaneously accompanied by the departure of financial capital" (UNDP 2006:10). Between 1990 and 1998 more than 35% of the research staff emigrated. The Brain Drain reached its peak in the period 1991 and 1993, which reflects the sudden opening of the country after decades of self-isolation and between 1998 and 1999 which is largely explained by the chaos after the collapse of the pyramid schemes (UNDP 2006:7). As a consequence nearly two thirds of all graduates interviewed in 1999 intended to emigrate (Pani 2006:56). The main host countries for Albanian

lecturers and researchers in 2005 were U.S. (26.3%), Canada (18.4%) and Italy (13.7%)(UNDP 2006:9).The absence of intellectuals is not only a threat to the economy but also to society as a whole and especially to the democratization process (Horvat 2004:79).A detailed analysis about Albanian PhD holders in industrialized countries showed, that their potential return would depend on higher remuneration, on the economic/political stability of the country and reduced level of corruption (UNDP 2006:26).

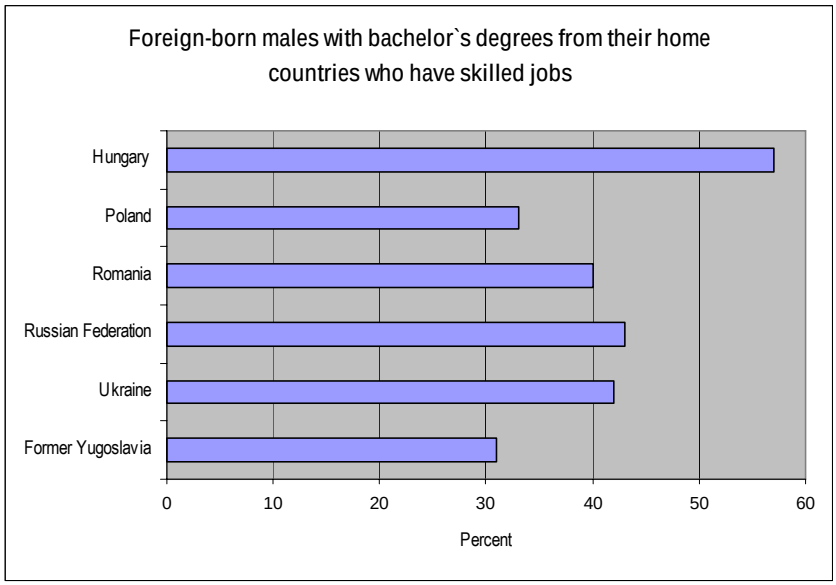
Macedonia, as stated above, is a country with a high selection rate (29%), its outward mobility can be characterized as Brain Drain. Between 1990 and 1995, the R&D staff decreased by over 70%.[20] The main destinations were the U.S., Canada, Australia, the UK and Germany (Horvat 2004:85). Janeska (2003) describes the mobility as "emigration of tertiary educated persons that is of long-term or permanent character, and it is reaching significant levels and not compensated by `feedback effects` of remittances, technology transfer, investment or trade" (cit. by Horvat 2004:85). Causes of this outward mobility are the socio-economic turbulence and the lack of sense that the situation will improve (Horvat 2004:85).

Some similarities can be seen to *Bosnia and Herzegovina*, where the situation for young potentials is far from encouraging. About 25% of the population left before and during the war, many of them were HQ. Recently, beside permanent out-migration, transnational forms of mobility and return of HQ who then start as entrepreneurs can be observed (Winkler-Lüth 2006:31).

The main risks for the R&D sector in the SEE region are "instability, limited mobility due to the visa regime, outdated and underdeveloped infrastructure, poor communication links and inadequate internal administrative procedures and structures" (SEE-ERA.NET Co-ordinator 2005:9).

For many of the countries mentioned, the U.S. are one of the main destinations, but not all HQ can work in their profession and therefore suffer Brain Waste. A recent study by Özden (see Figure 4) provides some data for selected countries.

Figure 4: External Brain Waste of immigrated HQ from selected countries in the U.S. (1990s arrival)



20Iulia Nechifor, Stamenka Uvalic-Trumbic (UNESCO); Helene Belndorfer (HP) 2005: UNESCO – Brain Drain News: http://portal.unesco.org/en/ev.php-URL_ID=27011&URL_DO=DO_TOPIC&URL_SECTION=201.html#fulltext (2.2.2007).

Source: Özden 2006:238, Fig.7.6. No other country data from post-communist countries in transition available

According to these figures, a majority of highly skilled foreigners from the countries in transition under investigation, except Hungary, suffers dequalification, External Brain Waste. Only every third immigrant from Former Yugoslavia and Poland could find an adequate job.

Brain Drain typically is a youth drain. Under the conditions in the sending countries mentioned above it seems to be clear that many young people of this region are searching for new opportunities abroad, namely by studying abroad.

Table 5: Students abroad from selected countries of South East Europe

	Students abroad from SEE - main destination countries (2004)								
	Total enrolled at home absolute	Share of students abroad %	Main destination countries (number of students) Rank 1			Rank 2			Rank 3	
Albania	43,600	30.3	Italy	(8,494)		Greece	(1,059)	U.S.	(916)
Bosnia/ Herzegovina	n.a.	n.a.	Germany	(2,801)		Croatia	(2,273)	Austria	(1,732)
Bulgaria	230,513	10.7	Germany	(12,116)		U.S.	(3,743)	France	(2,905)
Croatia	121,722	8.2	Germany	(5,347)		Italy	(1,357)	Austria	(1,073)
Serbia/ Montenegro	209,125	4.8	Germany	(3,747)		Hungary	(1,095)	Austria	(1,095)
Romania	643,911	3.2	France	(4,474)		Germany	(4,220)	U.S.	(3,320)
Austria	*229,802*	*5.2*	*Germany*	*(6,924)*		*UK*	*(1,308)*	*U.S.*	*(899)*

Source: Own design based on Institute of International Education, Atlas of Student Mobility 2007, http://www.atlas.iienetwork.org (2.2.2007). .No data available for other countries of the region.

A look at student mobility (Table 5) reveals that for South East European periphery students, the geographical closeness and the attractiveness of the scientific and educational relative core play a crucial role. Albania has nearly one third of its students abroad, which is one of the highest rates world-wide.[21] An outstanding position in attracting students from this region has Germany, which is one of the top destinations, except for Albanians. But even for them it is in 4th place. It must be stated, that since the 1990s the U.S. are most attractive for Albanian PhD students (24% of all Albanian students who enrolled for a PhD in industrialised countries during the period 1991-2000), followed by France (18%) (UNDP 2006:17).

Also Austria plays a crucial role, especially for students from the former Yugoslavia. In 2004, Bosnia and Herzegovina was the 4th-biggest sender of foreign students to Austria.[22] Among other neighbouring countries, the U.S. are a highly attractive target country, especially for Bulgarian, Romanian and Albanian students, and this in due consideration of the fact that student fees are much higher there than in Europe.

Detailed analysis of the mobility of SEE researchers and scientists is very rare. A DAAD survey (2006)[23] reveals that in 2004, 383 Romanians, 286 Bulgarians, 123 Serbs and Montenegrins and 83 Croatians were funded by German scholarships. According to NSF statistics (2007), none of the states of the region are among the top sending countries for scholars to the U.S., which means that each country must have fewer than 800 scholars in the U.S.

21 In comparison to all countries covered by IEE Statistics.

22 The country share is 5.1% of all foreign students in Austria (2004), after Italy(18.5%), Germany (18.1%) and Turkey (6.0%): Institute of International Education, Atlas of Student Mobility: http://www.atlas.iienetwork.org/?p=48030 (2.2.2007).

23 http://www.wissenschaft-weltoffen.de/2006/2/1/2/4 (27.1.2007).

3 The Hunt for Talent – Options How to Deal with HQ

In this chapter, general policy options of how to handle HQ mobility shall be discussed. Examples of practices for policy implementation are presented to reveal the conditions of success and failure. Since the 1990s, especially in the wake of expert shortages within the New Economy in the developed countries, the debate about HQ has developed a new dynamic. Political, economic and institutional actors have been faced with the question "how to attract and hold skilled labour" (Cervantes and Guellec 2002:1, Liebig 2004:2).

The conditions of the global competition for HQ can be characterized by three major powerful long-term trends (Kapur and McHale 2005:2ff). The *first* is the skill bias towards recent technological advancements, which leads governments to aspire to competitive advantage in the rising knowledge-based industries. The *second* is the aging society in rich countries, which leads to a reduction of the total population without immigration in general and without HQ immigration in detail. The *third* trend is bound to the broader globalization of production, trade and services. There, staff, especially highly skilled staff, is recruited and moved faster from one country/region to the next. Together with the expected continuing openness for highly skilled immigrants (in contrast to non-skilled workers), movements and transfer are going to be easier also in the future.

A useful framework for analysis of the different policy options is provided by Lowell and Findlay (2001:17-19), who see six avenues of dealing with HQ ("six Rs"):

1. Return of migrants to their source country
2. Restriction of international mobility
3. Recruitment of international migrants
4. Reparation for loss of human capital (tax)
5. Resourcing expatriates (diaspora options)
6. a. Retention through educational policies
   b. Retention through economic development

On the basis of this scheme, the literature has been gone through by the author in the following section.

3.1 Restriction and Reparation Options

These options were widely discussed in the early stages of the Brain Drain debate, especially in the 1970s, as the negative effects of human capital migrations seemed clear for the sending countries. As a result, policy measures like taxing emigration or hindering HQ in emigrating (e.g. Visaria 1974, Baghwati and Partington 1976, Gosh 2005:176) were planned. Restriction of emigration contravenes Human Rights and was a general practice of the former socialist countries. The reparation option means compensation for the "*often considerable spoils of emigration with those remaining behind*" especially in poor countries (Kapur and McHale 2005:177). A variety of measures was discussed, for instance direct compensation e.g. for every HQ recruited from a poor country, or a "Brain Tax". A form of Brain Tax was considered in Romania in 1982 as the government debated that talented emigrants would only be permitted to emigrate if they compensated the human capital investment of their tertiary education (Australia, Department of Foreign Affairs, 1982, cit. by Appleyard 1989:23).[24]

24 For details on the consequences of the Brain Drain from Developing Countries in United Nations UN–Fora and measures in the 1960s and 1970s, cf. d'Oliveira e Sousa (1988:198-205) and Stahl (1989). An Estimate of the Congressional Research Service of the

Another theoretical option is tax sharing or shared visa fees, which is favoured by Kapur and McHale (2005:182-83).

The Restriction and Reparation Options were tested on some cases in South Africa and Colombia, but the results were not satisfactory. Nevertheless, some representatives of the human capital theory have thus far approved of these measures, especially in the context of developing countries (Faini 2003:15-16, Carrington and Detragiache 1998:15, Kapur and McHale 2005,:180). Another measure discussed in this context is compensation in form of a higher production of HQ in the sending countries to balance the losses. These measures do not work, however, if the conditions that have led to the Brain Drain in the countries of origin do not improve. A classical example for this failure can been seen in the Philippines (Quaked 2002:160).

3.2 Recruitment Option

Recruitment is an active measure to attract HQ. As most countries suffer from an overaged society and a shortage of highly qualified persons, quality migrants are normally highly welcomed and are favored by the national immigration policies (Salt 2003:32ff, Todisco 2003:27). The best practice examples are the classical immigration countries United States, Canada and Australia, which very successfully recruited HQ after WWII, especially with a highly selective immigration policy that concerns temporary as well as permanent immigration programs for HQ. For the United States, the acquisition of best-qualified scientists from Europe became a requirement to win the cold war, especially after the "Sputnik Shock". With the "*Immigration and National Act*" of 1956, which simplified entry for privileged immigrants from different professional groups, the U.S. strengthened its pole position in the market for talents.[25] The share of HQ among immigrants has continuously increased to this day, especially after the introduction of special visas for HQ with the "*Immigration Act* of 1990. As a result, the quota for highly skilled immigrants (such as through the temporary H1B-visa", which frequently leads to a permanent stay) more than doubled in the following years. In 1993, about 147,000 H1B visas were distributed (Brandi 2003:10), the amount increased to 335,600 in 2000 (Docquier and Marfouk 2005:4).

Canada started with a point-based system for selecting immigrants in 1967, which has evolved into a highly selective system over the years, focusing on the country's skill shortages and improvements to long-term economic growth. In 2000, 83% of principal applicants had a bachelor's degree or better (Kapur and Mc Hale 2005:44). 3% of these applicants (1,465) were from Romania, which was in sixth place after predominantly Asian countries.

Australia did not open its borders to non-white immigrants until the 1970s (Bonifazi 2003:2) and implemented multiple programs for HQ that were not very attractive for applicants from post-communist transition countries (Kapur and McHale 2005:41). Between 1997-98 and 1999-2000, only 200 HQ from CEE immigrated (Bonifazi 2003:10).

For a long time, the U.S., Canada and Australia had a headstart, the EU took measures in that direction only relatively late (Salt 2003:32). The immigration policies of the EU – in comparison to the U.S., Canada and Australia – are less clear and "still oriented toward traditional targets such as

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United States Houses of Representatives (1974) showed that, in the years 1971 and 1972 emigration of HQ from Developing Countries to the U.S. arose costs of about US$ 646m and the U.S. saved US$ 718m opportunity costs (ibid.:203). Richmond et al. (1989:350) put the accumulated human capital of HQ of the Third World in Canada at about US$ 10 bn.

25 Between 1945 and 1965, 372,204 scientists, technicians and professionals immigrated, that is 16.9% of all immigrants in that period (Brandi 2003:5). This quota for HQ was higher than in Canada (11.2%) and Australia (8.2%). Adams, one of the earliest researchers on Brain Drain, estimated the earnings resulting from the import of the about 100,000 scientists between 1949 and 1967 at about US$ 4bn (Adams 1968:59). The 1970s and 1980s were characterized by increasing competition between the USSR and the U.S., the percentage of HQ among immigrants increased constantly, many of them came as illegal refugees from Eastern Bloc countries.

asylum seekers and applicants requesting family reunion" (Docquier and Marfouk 2005:4). There is some evidence, however, that in the past several years a growing number of European Countries has become more selective (ibid.). In 2002, the UK introduced a point-based system in its *Highly Skilled Migrant Programme* for persons with job offers and the prospect of permanent immigration after four years (Kapur and McHale 2005:41). A well-cited example is the Green Card, starting in 2000, which facilitates easier entry into Germany for persons educated in ICT.

A very important way of recruiting HQ – and still underestimated – is the hunt for foreign students especially by those countries which partly charge high student fees, e.g. the U.S., the UK and Australia. Representatives of these countries are present at student fairs all over the world. An active measure to keep the foreign students is the so-called *"student switching".* The U.S., Canada, Germany, Norway and the UK have been using this method to attract talented students: foreign students can change their status to that of native workforce. In Germany, the first 1,500 of 10,400 Green Cards were given out this way (Salt 2003:34). In France, foreign computer science students could easily enter the domestic labor market (Kuptsch 2003:7).

With some limitations, the mobility programs for EU researchers can been seen as a recruitment option that partly leads to a reallocation of researchers within the EU. Between 1994 and 2002, 11,802 Marie-Curie Fellows went to another EU country (van de Sande et al. 2005:77), of which 44% stayed in the destination country after the scholarship (ibid.:20), especially at the centres of science UK and Germany. The lowest return rate of all participants is registered among scientists from SEE, only 41% of all researchers returned to the home country (ibid.:Table 17:77).[26]

3.3 Return Option

Bringing back HQ to the sending countries has been successful in a small number of countries, e.g. Ireland, and since the 1980s in some Newly Industrialized Countries, namely Singapore, Taiwan, India, and China (Regets 2001:7, Quaked 2002:162). The return migration to Taiwan can be regarded as a success story in this respect. In the business park Hsinchu in the capital Taipeh, more than 50% of the entrepreneurs were remigrated Taiwanese (Iredale 2005:228). China is another example. Between 1978 and 2003, about 170,000 HQ of the emigrated 700,000 returned, with return rates particularly high in the coast cities (Müller 2005:246). Job creation for scientists was undertaken by e.g. making them advisors for the political elite.

India, where especially returned migrants from the Silicon Valley contributed considerably to establishing the domestic high tech industry, is also a well-known example.

According to Gosh, the success of the return option depends on three key factors: the migrants must have acquired skills and knowledge abroad that they would not have attained at home; these qualifications must be demanded in the sending country; and the returnees must be willing and able to adopt the knowledge and qualifications at home (Gosh 2005:179).

A major issue is the commitment of the political decision-makers and the readiness to supply large financial support for grants. Therefore this option is expensive.

In January 2004, the initiative brainpower Austria (launched by the Austrian Ministry of Transport, Innovation and Technology and managed by the FFG[27] started with a focus on the return options of

26 Also very successful Austrian Mobility Programmes, such as the Erwin Schrödinger scholarships (which are not limited to stays within the EU), may indirectly support recruitment intentions by other countries. Of the 698 Fellows interviewed, about 29% (have) prolonged their stay abroad, mainly in the U.S. (10%) (Warta 2006:22). Warta concludes: "In a linear perspective, some brain drain can therefore be observed. This necessarily opens the debate about the value of these persons abroad, either a loss of (above average) local research capacity, or as 'ambassadors' and 'bridge-heads' for national networks" (ibid: 24).

27 http://www.ffg.at/content.php?cid=96 (2.2007).

Austrian scientists abroad. In the meantime it has evolved into a successful networking and career platform also for foreign researchers (50%) and has granted access to the network also to scientists in Austria. By January 2007, 1,408 researchers (50% from Austria) had registered and 1,106 jobs had been offered. The platform cooperates with many research institutes and companies.[28]

A distinct return initiative is the Hungarian "Project retour"[29], which is a private undertaking by Regina Saphier, a returnee from the U.S.[30]

3.4 Diaspora Option

The Diaspora Option means resourcing expatriates. Although the aspects of the diaspora have more or less been discussed for all migrants since the early 1970s (de Haas 2006:11ff/17), and more intensively since the early 1990s, the connection to HQ was diagnosed in the late 1990s (Kaplan 1997, Kaplan et al.1999, Meyer et al. 1997, Meyer and Brown 1997, Meyer et al. 2001, Meyer 2001, Meyer 2003). Diaspora knowledge networks (DNP) have "deeply changed the way in which highly skilled mobility is looked at" (Meyer and Wattiaux 2006:5). Due to the fact that many countries cannot afford or are not willing to improve the R&D environment as well as living conditions at home, and theoretically supported by the beneficial aspects of Brain Drain (see above), this option accepts the reality and tries to see the positive aspects in the fact that many migrants do not want to return. Migrants "can constitute a valuable resource for the development in countries of origin is rather a potential than an automatic mechanism" (de Haas 2006:13). As Kapur and Mc Hale (2005:9) state: "The purpose here is to have a well-connected diaspora and capital-augmented return". The precondition for harvesting these benefits is that the link between sending and receiving countries is still intensive; it is also a very cheap method of knowledge transfer from the best R&D institutions abroad to the sending countries, which could additionally benefit from remittances. And of course it is the Internet which facilitates this form of communication.

As a consequence of this theory, many networks have been implemented. One of the earliest, and the most successful, has been the UNDP-initiated TOKTEN (Transfer of Knowledge Through Expatriate Nationals), which is still in force, in many cases as a *Brain Circulation Program* without requiring permanent return (de Haas 2006:17). Between 1977 and 1999 more than 5,000 volunteers on assignment in 49 developing countries took part in the program, at the moment it is run in about 35 countries.[31] In cooperation with the IOM, Bosnia-Herzegovina has recently joined the program. In the meantime, many diaspora knowledge networks (DNP) have developed. Based on evidence referring exclusively to developing countries until June 2005, Meyer and Wattiaux have identified about 158 networks (Meyer and Wattiaux 2006:10). In Europe, some of these networks were launched only recently, for example ASciNA (Austrian Scientists North America, founded in 2002)[32] and the German GAIN initiative (founded in 2004)[33], the Swiss online network Swiss-List.com and

28 Interview with Charlotte Alber, FFG (23.1.2007).

29 Cf. http://www.projectretour.org.hu/ (2.2.2007).

30 Cf. http://www.projectretour.org.hu/INFORMATION-GUIDE-TO-PROJECT-RETOUR_16Feb2005.htm (3.2.2007).

31 Cf. http://www.undp.org.lb/tokten/history.html (19.1.2007).

32 ASciNA has about 800 registered Austrian scientists in North America, about 500 are active members (Interview Dr. Lepperdinger, 16.11.2006). Details about the network: http://www.ascina.at/ (14.2.2007). It covers about 30-50% of the estimated 1,600-1,800 Austrian researchers in the U.S. (Interview Mag. Charlotte Alber, FFG, 23.1.2007).

33 Simons, Katja (2004): Competing for the Best and Brightest: Germany Gets in the Game: http://ostina.org/html/bridges/article.htm?article=1095 (2.2.2007).

SHARE ("Swiss House for Advanced Research and Education")[34]. The Swiss, German and Austrian networks aim at improving the links between and to the researchers abroad and to intensify their connection to the sending countries.

This perspective could be linked with the concepts of transnational mobility and transnational citizens/communities, which accentuate the relationships between sending and receiving countries. While research has been done in this direction, empirical data is still insufficient. The diaspora approach has many advantages: it is comparatively easy to launch and cheap and therefore a fast measure. Quaked (2002:160) states:

> "Furthermore, just as the diaspora try to influence their destination countries' politicians, they could attempt to urge the changes that are necessary to improve their home country's economic and political situation."

Also the EU recognizes diasporas as important potential actors in the development of countries of origin (CEC 2005:6) and fosters the diaspora communities to avoid Brain Drain and enable Brain Circulation. A concrete measure is the ERA-Link within CORDIS, founded in 2004. ERA-Link aims at the European diaspora of scientists, researchers and scholars in the U.S. "It provides information about research in Europe, European research policy, opportunities for research funding, for international collaboration and for trans-national mobility".[35] ERA-Link works closely together with other national networks, of the new member states only the Hungarian HunEx-net is represented in the ERA-Link.[36] Nevertheless some other national initiatives have been launched. The Community of Bosnia[37] tries to provide internships for young potentials in Bosnia-Herzegovina and to reconnect the Bosnian diaspora. The Serbian Unity Congress (SUC)[38] tries "to garner the talents, experiences and abilities of all Serbs and their friends abroad in order to help economic, social, cultural and other positive changes" in Serbia within a mentorship program.[39]

3.5 Retention through Educational Policies and Economic Development

The success of the above-mentioned options depends on the basic and surrounding conditions for the most talented. It is obvious that neither restriction, nor retention nor the diaspora approach will succeed if there is no hope for improvement of the conditions and no full commitment from the decision-makers at home. This includes higher investment in education, fostering student and staff exchange and the creation of a working environment that makes it convenient to stay or to return.

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34 There are other online-portals for the Swiss Scientific Diaspora Community: Networks of Competences: www.swisstalents.org, details at http://www.swisstalents.org/pdf/analyse.pdf (2.2.2004); Information Flows: www.swisstalents.org/eLists, Organized Data Mine: www.sciencelink.org (cf. Simm 2001:181/183).

35 http://cordis.europa.eu/eralink/about_en.html (2.2.2007).

36 Austria: www.ostina.org and www.ascina.at/
Belgium: www.diplobel.us/BelgianCitizens/Scholars.asp
France: www.forumusa.org and www.science-odyssee.org/
Germany: www.gain-network.org and www.daad.org
Greece: www.sae.gr/EN/Diktia/diktio_epistimonon.asp
Hungary: www.hunex.org
Ireland: www.biolinkusaireland.org
Italy: www.globescope.biz/italyscience/members.cfm
Portugal: www.papsnet.org (all links: 2.2.2007).

37 http://www.cobonline.org (17.2.2007).

38 See. „Our Mission": http://www.suc.org/sucinfo/mission.html (17.2.2007).

39 "The idea behind the Mentoring Program is to utilize the experience and expertise of Serbian American professionals by engaging members from the Diaspora to provide technical assistance for various development projects in Serbia."

As Lowell (2006) states: “Giving people reasons to stay (or return) is doubtless the most effective policy of boosting human capital ”.

Exemplarily just two projects in the R&D sector of SEE shall be mentioned.

One initiative originates from UNESCO, which started the public-private project “*Alleviating Brain Drain in South East Europe*” in 2003. Together with seven universities in Albania, Bosnia and Herzegovina, Serbia and Macedonia, this privately sponsored project is aimed at turning Brain Drain into Brain Gain. The universities received state-of-the-art-equipment to enable them to share computer power and data storage capacity (UNESCO 2006/07:7).

At the EU level, the SEE-ERA.NET, initiated by Austria, started in 2004 with the aim of structuring and expanding the European Research Area (ERA) to the Southeast European (SEE) countries by co-ordinating and supporting Research and Technological Development activities (SEE-ERA.NET Co-ordinator 2005:7) conducted at a bilateral level between 17 institutions from 14 countries. On the basis of existing networks, the interregional research co-operations shall be improved.

4 Conclusion

As pointed out above, HQ mobility is highly complex and therefore successful policies must take a multidimensional approach on an individual, institutional, regional, national, supra-national and global level. In addition to the evident factors, such as economic growth, relative and absolute income, and guarantee for human rights, the subject factors like the perspectives for the individual, the family and the children and other networks for the future are striking (Gosh 2005:181).

Reflecting on the literature and the poor statistical data, we can state that most of the post-communist countries, especially in SEE, are in the migration transition phases 1 and maybe 2 (see above). Brain Circulation in the sense that HQ who have spent some years abroad then return can rarely be observed. To outline the movements in detail, much more research needs to be done on different forms of HQ mobility, concerning both the statistical data supply and the theoretical background. Unless one exactly understands what *actually happens* with the Brains, one cannot delineate suitable policy measures, what *should happen* with the Brains. At any rate, it must be taken into consideration with regard to the R&D sector that not only the quantity but also the quality of the migrants matters. If all above conditions are reasonably fulfilled, the pull factors such as higher salaries, better working conditions, better opportunities to develop and – in research – the attractiveness of the centers of excellence are striking. In the case of South East Europe, further differentiation between nations and regions has to be done. Some initiatives to alleviate Brain Drain have been undertaken in the past few years, with hopeful prospects. It seems clear, however, that all strategies to regain the talents or profit from their knowledge and experience will fail if human rights, democracy, economic and political development do not ameliorate at home. Without increased awareness among the decision-makers, even the least cost-intensive possibility of profiting from the intellectuals abroad – the diaspora option – will fail.

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