POTENTIAL EMIGRATION OF SCIENTISTS FROM SLOVENIA IN THE MID 1990s[1]

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1. INTRODUCTION

Emigration is in most countries as a rule a poorly registered phenomenon, especially emigration of the highly educated – brain drain. In Slovenia, a small upper-middle-income country, the statistical basis (register of population, censuses) in this field is much better than in many other former socialist countries as well as in comparison to some developed countries. But despite this fact, on the basis of these sources no uniform conclusion is possible regarding the extent of total emigration and emigration of the highly educated from the country since the late 1980s when the great political and economic changes started (for the 80s as a whole there are signs that the propensity of those with higher education for emigration increased in comparison to the previous decade and was higher in comparison to other educational categories of population).[2]

Even more rare is the registration of external migration in different countries on the basis of the same methodology – that is the existence of the internationally comparable data on this migration. Furthermore, there is no statistical basis for the investigation of potential emigration.

A few years ago, the European Commission initiated the international research project on brain drain (of researchers) from former socialist countries (COST A2 project: Europe's Integration and the Labour Force Brain Drain).

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[1] This paper was presented in the *International Conference on Applied Statistics*, organised by the Slovene Institute of Social Sciences and Statistical Society of Slovenia in 1997 (Preddvor, September, 15–17, 1998).

[2] Source: Bevc, Logar, 1992; Bevc, Malačič, 1995.

Different dimensions of this brain drain were investigated – external (abroad) and internal (to non-scientific sectors) on the one hand, and real (in period 1988–94) and potential (probable in the 90s) on the other. Slovenia was included in this project together with the following nine countries in transition: Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania and the Slovak Republic. In this paper we use the term »region« when all the ten countries mentioned are considered as one group. The main purpose of the project was to estimate the extent, the reasons, motives and characteristics of the outflow of researchers abroad and to non-scientific sphere within the country. The main source of data in this project were surveys conducted in the science sector (surveying of researchers and institutions with researchers). No similar project exists for developed countries. The work of the Slovene research group was co-financed by the Slovene Ministry of Labour, Family and Social Affairs. The results are presented in four research reports.[3]

This paper depicts the methodology and results of analysing the potential emigration of Slovene researchers in the mid 90s within the mentioned international research project. It also includes the comparison of the »population«, sample and respondents. As a »potential emigrant« we defined a researcher who wishes, intends or would under special conditions go abroad for more than one year.

2. METHODOLOGY

Sample – some main characteristics and the method of selection of surveyed persons. – We surveyed 1012 researchers with master's and doctor's degrees. The basis for the selection of the surveyed persons was the population of 3542 researchers (with a doctor's or master's degree), registered at the Slovene Ministry of Science and Technology. We received the list with names and addresses of all these persons from the above-mentioned Ministry. The data on their education (level and field) and age could not be obtained by reason of the security of personal data; for this reason we could not exclude older researchers. As regards the data the Ministry demanded that the survey should be totally anonymous.

Random sampling was used since we had data on names and addresses at our disposal (in other countries systematic sampling was used). The process of selection of the surveyed persons was the following: The (220) institutions/firms

[3] Bevc, Malačič, 1995; Bevc, et.al., 1996; Bevc, 1996; Malačič, 1996.

with researchers (with doctor's and master's degrees) registered at the Ministry of Science and Technology were classified alphabetically and the researchers within each institution/firm were also classified in the same way. For the purpose of getting the sample of approximately 1000 scientists each third to fourth (3.5) researcher was selected (3500/1000 = 3.5) starting at the beginning of the list. For that reason some institutions/firms with fewer than 3 researchers were excluded from the sample. All scientists who informed us (by phone or by post) that they would not fill in the questionnaire for different reasons were replaced by others from the list of 3542 researchers.

Since the questionnaire had to be anonymous, it was sent to each individual participant (at the beginning of June 1995) separately by post to the address of his/her employment. The anonymity in returning the questionnaires was achieved by enclosing an envelope to each questionnaire addressed to the Institute for Economic Research.

To assure as great response as possible we did the following:

- We promised to give the results of the survey and the project to those who expressed their interest in them (by phone or by post).
- The letter from the Slovene Minister of Science and Technology was enclosed with each questionnaire (next to the letter from the Institute for Economic Research).
- After two weeks the first and after the following two weeks the second reminder was sent to each surveyed person (with an exception of those for whom we knew in one way or another that they returned the answered questionnaire).

Different signs led to the conclusion that all of these efforts had an important impact on the response. There were lots of telephone and written correspondence with the surveyed researchers. Many of them expressed the wish to get the results after finishing the project. They got its summarised version.

By the deadline (the same for all countries included in the above-mentioned international project) 648 questionnaires were returned, that is 64% of the total number of those to which the questionnaire was sent and 19% of the total »population« which represented the basis for the selection of the sample. The response could have been even greater if the process of surveying had started two or more weeks earlier.

Some main problems in the process of surveying and in the analysis of questionnaires. – We can summarise these problems as follows:

1. The Ministry's list of researchers was not entirely up to date as regards some institutions, since some of the addressed persons were already retired or dead.
2. Since we did not have the data on the age of the surveyed persons, the questionnaire was sent to many older researchers (just before retirement), too.
3. For the question on research field (discipline) the original uniform code book (used in all 10 countries) was not enclosed to the questionnaire which had some advantages and disadvantages:

– Advantages: This code book would most probably dissuade some surveyed persons from filling in the questionnaire, since the classification included in the code book differs in some aspects from some other internationally or nationally valid classifications.
– Disadvantages: Since some surveyed persons defined their scientific discipline too broadly or too narrowly, we had a lot of problems correcting the grouping of such examples. In the process of coding the answers to this question a lot of scientists from different disciplines helped us.

Methods used in the analysis of the data. – The factors of potential external (and internal) brain drain were obtained by the statistical analysis (SPSS) using the Spearman and Cramer coefficients. The methodology was mainly the same in all countries included in the international project.

3. THE COMPARISON OF THE SAMPLE, THE POPULATION AND THE PART OF IT THAT RESPONDED TO THE QUESTIONNAIRE

The comparison includes the scope, age, gender and education (data on age and education were obtained from the Ministry of Science and Technology after the surveying).

The comparison of the sample and the population (of scientists):

- ***The institutions/firms by the scope of the »scientific basis« and their inclusion in the sample.*** – Since one of the requests in the process of selection of the surveyed persons was to include the scientists from all the biggest scien-

tific institutions, the following explanation is important: In Slovenia in 1995 the majority (57%) of scientists with master's and doctor's degrees were concentrated in 17 biggest scientific institutions with 50 and more such scientists per institution (among them there were 13 institutions of higher education). The distribution of the rest of the researchers with master's and doctor's degrees (registered at the Ministry of Science and Technology) was the following (in 1995 – see Table 1): 27% in (35) institutions with 15 to 49 such scientists (among them a half of these institutions presented the institutions of higher education), 10% in (47) institutions with 5 to 14 such scientists (among these institutions the majority presented state research institutes), and 6% in 121 different institutions/enterprises with fewer than 5 mentioned researchers per »unit«. For the sake of the method of selection of the surveyed persons (each third to fourth researcher within particular organisations which were ranked by alphabetical order – similarly as researchers) the same proportion of scientists with master's and doctor's degrees from all types of institutions/firms was included in the sample (29% – see Table 2). The only exception were institutions/firms with fewer than 3 such scientists.

- ***The comparison of some structural characteristics.*** – The structure of the sample and the population by the level of education (master's and doctor's degrees) and gender were almost the same, and the structure by the age was very similar as well (Table 3).

The comparison of the surveyed persons who responded to the questionnaire with the sample. – 64% of scientists included in the survey returned the answered questionnaires as it has already been mentioned. The structure of the sample and that of participants who answered the questionnaire were almost the same by the level of education and gender, and the structure by the age differed in the direction expected. On average, those who responded were slightly younger than all scientists included in the sample. The response to the questionnaire was the greatest among the youngest and it decreases with the age of participants.

The comparison of the population with those scientists who responded to the questionnaire. – As a result of the size of the sample (29%) and the willingness of the surveyed persons to collaborate in the survey (64% response) we got the answers to the questionnaire from a very large part of all the Slovene scientists (almost one fifth – 19%). The structure of those scientists who filled in the

questionnaire and that of the whole population of scientists are almost the same as regards the level of education and the gender. The structure by the age differs in the following: on average the total population is slightly older than those scientists who answered the questionnaire.

Table 1: »Population« – institutions/enterprises by the average and total number of researchers with master's and doctor's degree – May 1995

Number of researchers with M.A., M.Sc., Ph.D.	Number of institutions/ enterprises with researchers observed	Structure (%)	Total number of researchers with M.A., M.Sc.,Ph.D.	Structure (%)
- less than 5	121	55.0	211	5.9
- from 5 to 14	47	21.4	362	10.2
- from 15 to 29	23	10.4	486	13.7
- from 30 to 49	12	5.5	474	13.4
- from 50 to 99	10	4.5	785	22.2
- 100 and more	7	3.2	1224	34.6
Altogether	220	100	3542	100

Calculated on the basis of data of the Slovene Ministry of Science and Technology.

Table 2: The share of »population« in the sample (%)

POPULATION	SAMPLE		% OF POPULATION IN THE SAMPLE	
Number of researchers with M.A., M.Sc., Ph.D	Number of institutions/ enterprises (indirectly through researchers)	Number of researchers in the sample	Institutions/ enterprises	Researchers
- less than 5	59	61	49	28.9
- from 5 to 14	47	102	100	28.2
- from 15 to 29	23	140	100	28.8

- from 30 to 49	12	134	100	28.3
- from 50 to 99	10	224	100	28.5
- 100 and more	7	351	100	28.7
Altogether	158	1012	72	28.6

Calculated on the basis of data of the Slovene Ministry of Science and Technology and 648 questionnaires.

Table 3: The comparison of researchers who answered the questionnaire to the sample and the »population« by some structural characteristics (%)

	Population	Sample	Researchers, who answered the questionnaire
Education	100	100	100
- Ph.D.	54.6	55.9	56.6
- M.A., M.Sc.	45.4	44.1	43.4
Sex	100	100	100
- female	28.5	28.2	28.3
- male	71.5	71.8	71.7
Year of birth	100	100	100
- 1965 or later	5.5	4.8	5.9
- from 1955 to 1964	35.6	34.7	37.5
- from 1945 to 1954	29.7	33.2	33.7
- from 1935 to 1944	19.5	19.0	16.2
- 1934 or earlier	9.7	8.3	6.7

Calculated on the basis of data of the Slovene Ministry of Science and Technology and 648 questionnaires.

4. SOME MAIN CHARACTERISTICS OF SURVEYED RESEARCHERS IN COMPARISON TO OTHER COUNTRIES IN TRANSITION

Through the questionnaire, the following dimensions of scientists were observed: demographic characteristics, professional characteristics, work conditions, hierarchy of values and the estimation of their achievement in the next five years under different circumstances, demand for scientific work within the country, economic situation, professional contacts with other countries (previous, current, planned future). Some main conclusions for Slovenia in comparison to other countries in transition that were observed are:

- Demographic characteristics: higher percentage of men (72% to 64% for the »region«).
- Professional characteristics: the structure by the scientific field was the following: 47% from natural, medical and biotechnical sciences, 29% from technical and 23% from social sciences and humanities. The first group was larger and the latter two smaller than in the »region«. The majority of scientists (54%) were employed in institutions of higher education (more than in the »region«). 40% of the surveyed scientists had worked in the field of science up to 10 years (region – 30%), and 60% of them for a longer period (region – 70%); 38% of the surveyed persons had a leading position in the institution of their employment (region – 35%).
- Work conditions: on average better than in the majority of the other countries observed.
- Hierarchy of values and their achievement in the next five years in different circumstances (continuation of scientific work within the country, change of the field of activity within the country, continuation of the work abroad): Among the most important values (»very important«) the Slovene scientists listed the following: professional fulfilment, topical scientific information, availability of key publications and good research infrastructure. The comparison with the average for the »region« is the following: a higher share of the respondents thought they would most probably achieve the majority of values (there are two exceptions: good research infrastructure and financial prosperity) in the next five years to the highest degree by the continuation of their scientific work within the country.

- Economic situation: on average better than in the »region«; they estimated their financial situation in the time of surveying to be somewhere between »we can survive« and »we can save some money from our income«.

5. POTENTIAL EMIGRATION OF SLOVENE RESEARCHERS

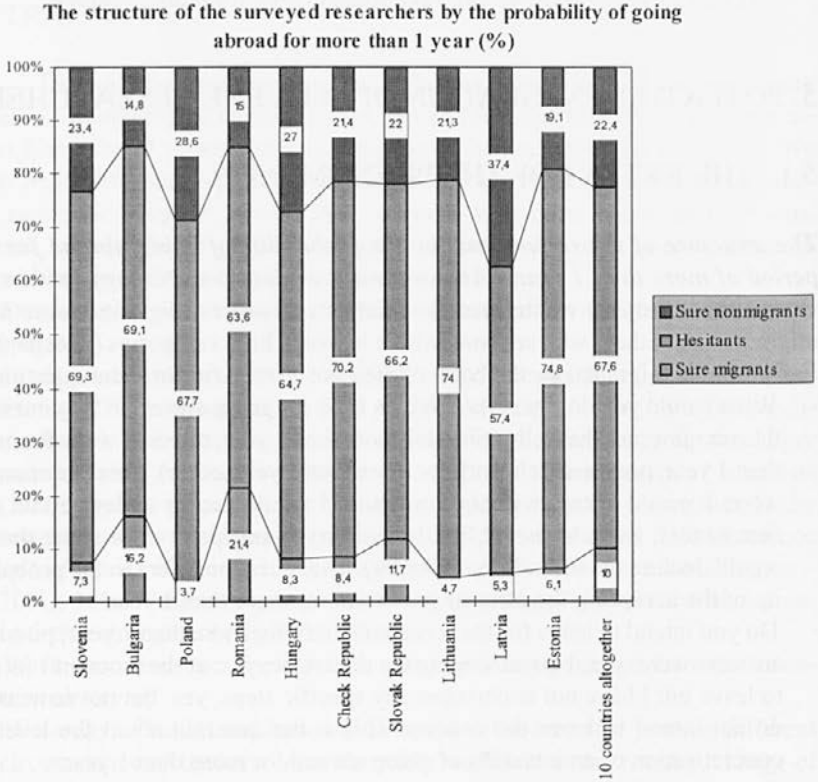
5.1. THE EXTENT OF THE PHENOMENON

The structure of the respondents by the probability of going abroad for the period of more than 1 year. – In the context of joint methodology (within the international project) we defined the scientists as »sure« migrants, »sure non-migrants« and others who are somewhere between both categories (»hesitant« – less probable migrants) on the basis of their answers to two broader questions:

- What would you do if you received an offer for going abroad in the course of the next few months (fellowship for more than 1 year, research work for more than 1 year, non-research work for more than 1 year, other); possible answers were: I would accept without hesitation, I would accept under certain circumstances, I would accept, but I would try to postpone it for some time, I would decline the offer, I do not know). This question refers to the probability of the accepting the offer to go abroad for more than 1 year.
- Do you intend to leave for the foreign country for more than 1 year; possible answers were: yes, I am arranging the departure; yes, at the moment I intend to leave but I have not undertaken any specific steps; yes, but not now; no, I do not intend to leave the country. This is the question about the level of concretisation of an intention of going abroad for more than 1 year.

The above-mentioned probability of going abroad for more than 1 year reveals the following structure of the Slovene respondents: sure migrants 7%, hesitants 69%, sure non-migrants 24%. The structure is similar to the structure of 7300 surveyed scientists from all 10 countries altogether (10%, 68%, 22%). Among the Slovene respondents about 76% were potential emigrants, but most of them were hesitants (see Figure 1).

Figure 1



The structure of potential (e)migrants regarding the intended period of staying abroad [4] (see Figures 2, 3 and 4 and Table 4). – It is possible to distinguish the following three groups:

- short-term (1–3 years) emigrants: 75% (sure 20%, hesitants 55%); in all other countries observed except Bulgaria the share of these emigrants is higher;

[4] Only a part of potential emigrants is considered (36% of all potential Slovene emigrants) since only a part of potential emigrants was »expected« to answer the question of the intended duration of being abroad.

- medium-term (4–5 years) emigrants: 10% (sure 1%, hesitants 9%); a higher share than in all other countries except Bulgaria, Romania and Lithuania;
- long-term (more than 5 years) emigrants: 15% (sure 6%, hesitants 9%); a higher share than in all other countries except Bulgaria.

The propensity of the surveyed Slovene scientists to medium-term and long-term emigration was in the mid 90s higher than in the »region«, which is mainly the consequence of the structure of less probable emigrants (hesitants).

Despite the fact that the majority of potential emigrants present less possible (hesitant) short-term emigrants (42% of all respondents), the extent of potential long-term and medium-term emigration (both presenting 25% of total potential emigration and 19% of all respondents) is also relatively high. The percentage of very probable (sure) medium-term and long-term emigrants presents 7% of potential emigrants and 5% of all respondents. The structure of potential emigrants could be (due to the method used for surveying – random sampling – and the similarity of the population and the respondents by many dimensions) generalised to the total »population« of researchers with master's and doctor's degrees. If so estimated extent of sure long-term emigration of scientists was approximately close to the reality, the extent of potential emigration in the mid 90s would be much larger than was the real emigration in the period 1988–94 (in this period: it accounted to less than 0.5% of the »population« per year).

Figure 2: **The structure of the potential emigrants by the intended duration of being abroad (%)**

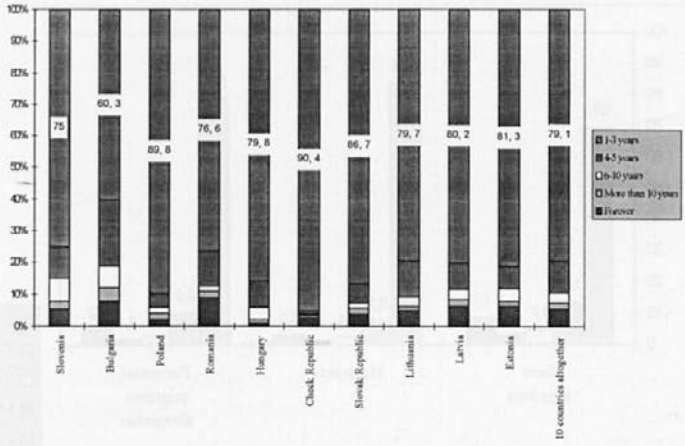


Figure 3:

The probability of going abroad for more than 1 year and the intended duration of being abroad (%) - Slovenia

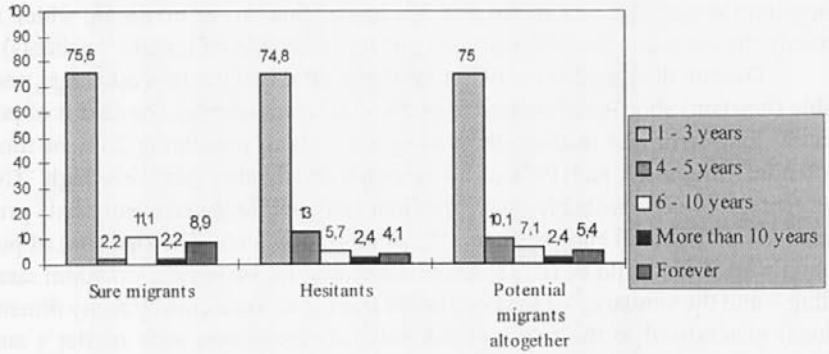


Figure 4:

The probability of going abroad for more than 1 year and the intended duration of being abroad (%) - 10 countries

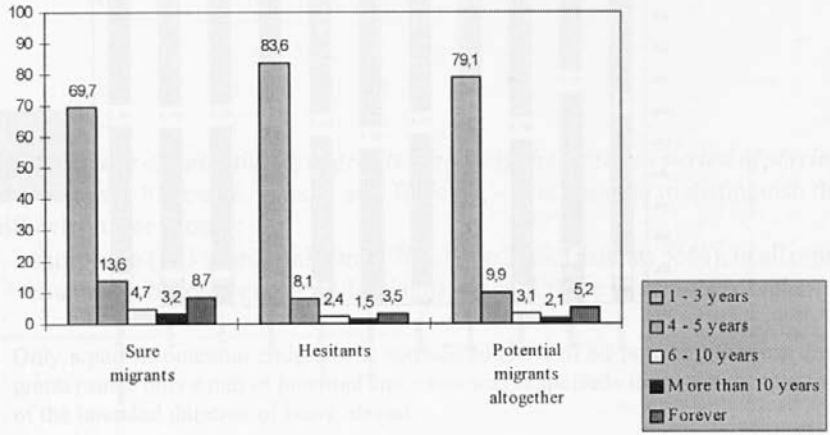


Table 4: The structure of potential emigrants in Slovenia and in 10 countries in transition together in two dimensions: probability of going abroad for more than 1 year and the intended duration of being abroad – 1995 (%)

Intended duration of being abroad	Sure migrants	Hesitants	Potential emigrants altogether
SLOVENIA			
1 to 3 years	20.2	54.8	75.0
4 to 5 years	0.6	9.5	10.1
6 to 10 years	3.0	4.2	7.1
more than 10 years	0.6	1.8	2.4
forever	2.4	3.0	5.4
Altogether	26.8	73.2	100
10 COUNTRIES IN TRANSITION ALTOGETHER			
1 to 3 years	22.5	56.6	79.1
4 to 5 years	4.4	5.5	9.9
6 to 10 years	1.5	1.6	3.1
more than 10 years	1.0	1.0	2.1
forever	2.8	2.4	5.2
Altogether	32.3	67.7	100

Table 5: Estimated percentage of different categories of potential emigrants in total »population« of Slovene researchers with master's and doctor's degrees – 1995 (%) [5]

Intended duration of staying abroad (in years)	Sure migrants	Hesitants	Potential emigrants altogether
1 – 3	15.4	42.0	57.5
4 – 5	0.5	7.3	7.8
6 – 10	2.2	3.2	5.4
more than 10	0.5	1.4	1.8
for ever	1.9	2.2	4.1
Altogether	20.5	56.1	76.6

5.2. CHARACTERISTICS OF RESPONDENTS REGARDING THE PROBABILITY OF GOING ABROAD FOR MORE THAN 1 YEAR

On the basis of a statistical analysis we assessed the factors which influence the probability of going abroad for more than 1 year. In the text that follows they are analysed in context of particular characteristics of respondents and are presented in bold italic type.

Demographic characteristics. – ***Age*** – young, especially those aged 30 or under are more inclined to go abroad for more than 1 year. ***Marital status*** – single and divorced are more inclined to go abroad for more than 1 year than married. ***Number of children under 18*** – in Slovenia those with one child are more inclined to go abroad than others. Among the above-mentioned three factors age exerts the strongest influence – among other countries the influence of this factor is the

[5] The estimation is based on two assumptions: 1. that the structure of 36% of potential emigrants, for who the intended duration of being abroad could be observed, is valid for all potential emigrants, 2. that the so derived estimated percentage of potential emigrants in total number of respondents is valid also for the total »population« (3542 of researchers with master's and doctor's degrees).

strongest in Hungary and Latvia. ***Other*** demographic factors: *Sex* – women in Slovenia are much more inclined to go abroad for more than 1 year than women in the region. At the same time they are more inclined to sure migration than men in Slovenia (but we have to bear in mind that here the intended period of migration is not taken into account).

Professional characteristics. – ***Level of education*** – researchers with master's degrees are more inclined to go abroad for more than 1 year than researchers with doctor's degrees (in all other countries observed there are no statistically significant differences between both groups of researchers). *Broader scientific field* – Researchers from social sciences and humanities are more inclined to sure departure from the country for more than 1 year than other researchers, and researchers from technical sciences are more inclined to less probable emigration in comparison to other researchers. *Narrower scientific field* (discipline) – The probability of sure migration is the highest among the researchers from the fields of transport, electronics and architecture and the probability of less probable migration is the highest among the researchers from engineering, medicine and chemical technology. *Employment* – The probability of sure migration is the highest among the researchers from non-state research institutes and »other« institutes (enterprises, medical institutions, etc.). *Position within the organisation* – the propensity to leave the country for more than 1 year is higher for researchers occupying some leading position within the institution than for those without such a position.

Work conditions. – They have no influence on the probability of going abroad for more than 1 year except the ***availability of required professional information*** (a similar result is observed in the »region« as a whole). In the majority of conditions observed except in the »necessity of dealing with tasks which could be carried out by less qualified fellows« the situation of sure migrants is worse than that of hesitants and sure non-migrants.

Hierarchy of values and their best realisation within the next 5 years. – The *valuation* of the following 6 out of 12 values observed exerts an influence: ***career development, salary/financial prosperity, position within the organisation, good research infrastructure, modern way of life, professional fulfilment***, but all of them exert weak influence on the probability of going abroad for more than

1 year – the strongest influence is that of career development and salary. All the above-mentioned 6 values are more important for sure migrants than for hesitants and sure non-migrants. For other 6 values observed the differences among different groups of respondents regarding the probability of going abroad for more than 1 year are not statistically significant, and the job security is most important for sure non-migrants. Similar results were obtained for the majority of other countries observed, where besides the above-mentioned 6 values the importance of two additional values – information for scientific work and the availability of key publications – is also statistically significant. *In the next 5 years* sure emigrants in Slovenia will achieve the majority of values observed to the greatest extent with the continuation of their work abroad, and sure non-migrants will achieve this to the highest extent by means of the continuation of scientific work within the country.

Demand for scientific work within the country. – As in the majority of other countries observed it has no influence on the probability to leave the country for more than 1 year.

Economic position. – Financial situation of the family of the surveyed researchers – ***financial situation in the time of surveying*** (this is also true of the majority of other countries observed) and the ***change in the financial situation in the 90s*** are two important factors. The influence of these two dimensions of financial situation is the following: The current financial situation of sure migrants is the worst (of sure non-migrants is the best) and in the last few years before surveying the financial position of their families had not changed (the financial situation of hesitants and sure non-migrants had slightly improved). The expectations for 1996–1997 do not influence the probability of going abroad for more than 1 year – on average all the surveyed persons expected a minor improvement. Besides the above-mentioned two dimensions of the financial situation the ***share of the researcher's salary (for his/her scientific work) in the family income*** is important, too – the families of potential migrants are more dependent on the salary of the surveyed researchers than the families of sure non-migrants. This can be the consequence of the fact that on average potential migrants are younger than sure non-migrants and that among them the share of the single researchers is higher than among sure non-migrants. Among all the above-mentioned economic dimensions the probability of going abroad for more than 1 year is mostly influ-

enced by the changes of the financial situation of the researcher's family during the last few years before the surveying.

Professional contacts with other countries in the 90s (being abroad for different professional reasons). – The visits to foreign countries for the following professional reasons exert statistically significant influence: ***postgraduate study, doctoral study, international conferences/workshops, short training, joint research projects/networks*** (especially being in Germany for doctoral study or joint research projects/networks). Sure migrants went abroad more often because of the above-mentioned professional reasons than less probable migrants (hesitants) and sure non-migrants; they most frequently visited Germany and Austria. *Current work on joint research projects* – the probability of going abroad for more than 1 year is higher among those who take part in such projects/networks.

Some characteristics of a planned stay abroad for more than 1 year. – The following characteristics exert statistically significant influence: ***seeking intermediate agency abroad*** (sure migrants are much more inclined to this step than less probable emigrants), the ***purpose of going abroad*** (strong influence) – for sure migrants the main purpose is professional training, for hesitants the main purpose is work in research institutions or institutions of higher education (for both groups of potential migrants the second most frequent purpose is the same – work in joint research projects/networks), ***the country of destination*** (strong influence – in all other countries observed this factor exerts no influence). Regarding the country of destination the following was observed: in both groups of potential emigrants (sure, hesitants) the most frequent countries of destination are the same – the USA and Germany (the same is true of the majority of other countries observed), but among less probable migrants these two countries are much more frequent than among sure migrants, and on the other hand the ranking of other most desired/probable countries differs very much in both groups of potential migrants. For sure migrants the two above-mentioned countries are followed by Austria and Australia/New Zealand, and for hesitants Great Britain and France.

Factors of dissuading from emigration. – The following factors exert statistically significant influence: ***separation from the family, homesickness, health***

reasons, non-recognition of academic degrees and diplomas, administrative and legal problems with the local authorities (abroad) – For sure migrants the first three factors are much less, and the last two more important than for less probable migrants (hesitants).

5.3. CHARACTERISTICS OF POTENTIAL EMIGRANTS REGARDING THE PLANNED DURATION OF THE STAY ABROAD

No special statistical analysis has been made concerning the influence of particular factors of planned duration of going abroad for more than 1 year; in the text that follows particular characteristics are analysed mainly on the basis of cross-tabulation.

Demographic characteristics. – *Sex* – for a shorter period of time (1–3 years) women are more inclined to go abroad than men, whereas for a longer period of time men are more inclined to go abroad than women. *Marital status* – single and divorced researchers are more inclined to short-term, medium-term and long-term emigration than the married ones, the widowed researchers are not inclined to any type of migration. *Age* – the influence of age is the strongest in short-term emigration – the youngest researchers (30 years and under) are much more inclined to this type of emigration than the older ones. The influence of age is also obvious in the case of migration »for good«, to which researchers aged 31–35 are much more inclined than the others; in the case of other durations of staying abroad the age does not play an important role. Conclusion: researchers under 35 years are more inclined to short-term and long-term migration than the older ones.

Professional characteristics . – *Level of education* – researchers with master's degrees are much more inclined to all different durations observed except to 6–10 years than researchers with doctor's degrees. *Broader scientific field* – the propensity to short-term migration is the highest among the researchers from social sciences and humanities, to medium-term migration (6–10 years) among the researchers from natural, medical and biotechnical sciences, and the propensity to long-term emigration is the highest among researchers from technical

sciences. *Narrower scientific field* – researches from the following disciplines are inclined to emigration for a period longer than 6 years: electrotechnics, electronics, engineering, ecology, medicine, chemistry, chemical technology, biology. *Employment* – researchers from the higher education sector are the least inclined to all kinds of emigration regarding the period; within this framework they are mostly inclined to short-term emigration; the propensity to long-term emigration is the highest among the researchers from non-state research institutions, enterprises and medical institutions (outside the higher education system). *Work experiences within the science sector* – researchers with 6–10 years of work experiences within the science sector are inclined to stay abroad of up to 5 years, whereas those with 6–15 years of such experiences are more inclined to longer emigration than other researchers. *Position within the organisation* – researchers occupying any leading position within the institution are more inclined to long-term emigration than those without such a position.

Work conditions. – On average those who plan to go abroad for a longer period have worse work conditions than those who plan to go abroad for a shorter period.

Hierarchy of values. – For researchers who plan to go abroad for more than 10 years or for good, the following values are more important than for non-migrants: career development, professional fulfilment, salary/financial prosperity, good research infrastructure, information required for scientific work, modern way of life.

Demand for scientific work within the country. – In Slovenia the researchers whose work is demanded by the private sector and foreign commissioning institutions are more inclined to long-term emigration than other researchers.

Economic situation/characteristics. – *Financial situation of the researcher's family in the time of surveying* – it is worse for short-term than for medium-term and long-term emigrants. *Changes of the financial situation of the researcher's family in the 90s* (since 1990) – to short-term emigrants it has slightly improved, to other potential emigrants (medium-term, long-term) it has on average deteriorated or remained unchanged. *Expected changes in the financial situation of the researcher's family for 1996–1997* – on average the biggest group of researchers

– those who plan to stay abroad for 1–3 years – has the best expectations, whereas those who plan to stay abroad for more than 10 years have the worst expectations.

Characteristics of a planned stay abroad for more than 1 year. – *Steps undertaken in connection with the intention* to leave the country for more than 1 year – for periods shorter than 10 years the main step is to look for the assistance from colleagues abroad, for longer emigration the main step is to read the advertisements in specialised international journals. *Country of destination* – among those who plan to stay abroad for 1–5 years most of them plan to go to the USA, Germany and Great Britain, among those who plan to go abroad for 6–10 years, the most desired countries/regions are the USA, Austria and Asia, and among those who plan to go abroad for more than 10 years or for good, besides the USA the most desired countries are: Germany, France, Great Britain, Scandinavian countries, Canada and Australia. For the majority of researchers the main *reasons for choosing a particular country* are better conditions for scientific work and the familiarity with the conditions in the country, since they have already been there. *The purpose of staying abroad for more than 1 year* – For almost all the periods observed the two main purposes for leaving Slovenia for more than 1 year are to work at a research organisation/institution of higher education and to work on joint research projects/networks; but the main difference between short-term (1–3 years) and longer emigration is that professional training is of great importance for short-term emigration, whereas work outside the science sector plays an important role in longer emigration. Work in international organisations is important for staying abroad for 6–10 years. *Factors of dissuasion from leaving the country for more than 1 year* – For those who plan to go abroad for more than 10 years or for good, the main factors are the separation from one's family, health reasons and administrative and legal problems with local authorities abroad (in the country of destination). Other factors would have small or no influence on their decision/intention.

CONCLUSIONS

Brain drain from former socialist European countries is a very »hot« topic in the 90s. Within this phenomenon for different purposes, the brain drain of researchers as an important part of the human capital is especially important.

Since no comparable international data exists on the topic, the European research project which covered 10 European countries in transition, was started in 1994. It investigated the real and potential external and internal brain drain (of researchers) from this part of Europe.

The paper presented the analysis of potential emigration of researchers from Slovenia with an emphasis on the methodology of surveying and the results obtained. The questionnaire used in surveying was consistent in all countries, but the method of surveying varied. Random sampling was used only in Slovenia (in other countries, systematic sampling was used), allowing some generalisations for the total »population« of researchers.

Potential external mobility of Slovene scientists is high in absolute and in relative terms (in comparison to other 9 countries observed) and regarding the structure of this mobility/migration the potential brain loss is also considerable. The potential brain loss is the highest among scientists outside the higher education system and state research institutes, and on the other hand it is the highest among scientists from technical sciences.

The profile of the potential long-term emigrant is the following: single man with master's degree, aged between 30–35, from technical sciences, employed outside the higher education system and state-research institute; he goes abroad mainly for the reason of better conditions for scientific work.

Two important fields for the science policy and the national development strategy on the basis of surveying the researchers in Slovenia are: technical sciences and scientists outside the higher education system.

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POVZETEK

POTENCIALNO IZSELJEVANJE ZNANSTVENIKOV IZ SLOVENIJE SREDI DEVETDESETIH LET

Milena Bevc

Emigracija - zlasti najbolj izobraženih - je v večini držav neznan ali pa zelo slabo evidentiran pojav. Članek prikazuje metodologijo in rezultate analize potencialne emigracije slovenskih raziskovalcev z magisterijem ali doktoratom sredi devetdesetih let na podlagi anketiranja posameznikov. Raziskavo smo izvedli v okviru mednarodnega projekta o odlivu raziskovalcev iz desetih držav vzhodne in srednje Evrope. Iz več razlogov (uporaba slučajnostnega vzorčenja, velik vzorec

– 1000 raziskovalcev ali 29% »populacije«, velik odziv raziskovalcev – 64%, itd.) so rezultati raziskave za Slovenijo zelo pomembni in uporabni za politiko države na področju raziskovalnega sektorja. Glavni rezultat analize je, da je potencialna zunanja (mednarodna) mobilnost slovenskih raziskovalcev visoka v absolutnem in relativnem pogledu (v primerjavi z ostalimi devetimi opazovanimi državami) in da je glede na strukturo te mobilnosti/migracij obseg potencialne izgube »možganov« (število potencialnih dolgoročnih emigrantov, ki so se že dokončno odločili za odhod v tujino) velik.