

POTENTIAL EMIGRATION OF SCIENTISTS FROM A SMALL EU COUNTRY  
(Draft)

Milena Bevc and Sonja Uršič

Institute for Economic Research, Kardeljeva ploščad 17, 1000 Ljubljana, Slovenia

## 1. INTRODUCTION

Emigration is in most countries as a rule a new 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 countries. But despite this fact, on the basis of these sources no uniform conclusion is possible regarding the extent of emigration of the highly educated from the country since the mid 90s when the first and last analysis of brain drain among scientists was made (at that time potential emigration was high, also in comparison to other former socialist countries).<sup>1</sup>

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. Further, without any statistical basis is the investigation of potential emigration and furthermore, very rare is the investigation of trends in potential emigration in the period of 10 years with the same methodology.

In the mid 90s 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). Different dimensions of this brain drain were investigated – external (abroad) and internal (from research to non-scientific sectors) on one side, and real (in period 1988–94) and potential (probable in the 90s) on the other side. 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. Results for Slovenia are presented in four research reports.<sup>2</sup> Ten years latter the investigation of real (in period 1995-2004) and potential emigration (probable in the year 2005) was undergone again for Slovenia, using in the case of potential emigration the same methodology, size of the sample and type of sampling as in the mid 90s. On the other hand real migration was analysed more extensively and deeply than 10 years before. These

---

<sup>1</sup> Source: Bevc, Malačič, 1995 ; Bevc, et.al. 1996.

<sup>2</sup> Bevc, Malačič, 1995; Bevc et al. 1996 ; Bevc, 1996; Malačič, 1996.

analyses were made within two different research projects (Bevc, Uršič, 2006; Bevc, Koman, Murovec, 2003, 2004, 2006), carried out by the Institute for economic research in Ljubljana and financed by few Slovene ministries and some other state departments.<sup>3</sup> The main purpose of the project on potential emigration in 2005 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 was survey conducted in the science sector (surveying of researchers).

This paper depicts the overview of literature and analyses available (chapter 2), methodology (chapter 3) and results (chapter 6) of analysing the potential emigration of Slovene researchers in 2005 and their comparison to the abovementioned analysis in 1995. It also includes the comparison of the “population”, sample and respondents (chapter 4) and presentation of some characteristics of Slovene scientists (chapter 5). As a "potential emigrant" we define a researcher who wishes, intends or would under special conditions go abroad for more than one year. Paper ends with summarising some main conclusions.

## 2. OVERVIEW OF LITERATURE

We are in the process of reviewing the latest literature.

## 3. METHODOLOGY

**Sample - some main characteristics.** - We surveyed 1434 researchers with master's and doctor's degrees. The basis for the selection of the surveyed persons was the population of 5769 researchers (with a doctor's or master's degree), registered at the Slovene Research Agency. On the contrary to the mid 90s this time we had data on education (level and field) and age of scientists on our disposal which enabled us to exclude older researchers (men – older than 60 years, women – older than 54 years)<sup>4</sup> from entire population. So our final population (limited by the age) for selection of the sample counted of 5019 researchers. Likewise in 1995 the survey was totally anonymous. The size of the sample (28.6%) was the same than in the mid 90s.

---

<sup>3</sup> Ministry of Education, Science and Technology, Ministry of Commerce, Slovene Research Agency, Institute for Macroeconomic Analysis and Development.

<sup>4</sup> This solution was arbitrary: As the upper age limit we used the age for retirement determined at full retirement period in year 2005 (55 for women, 61 for men) shortened by one year.

Random sampling was used since we had data on names and addresses of employment at our disposal. The same type of sampling was used in the mid 90s (in other countries included in the above-mentioned international project the systematic sampling was used).<sup>5</sup>

Since the questionnaire had to be anonymous, it was sent to each individual participant (at the beginning of October 2005) separately by post to the address of his/her employment. By the deadline 588 (in 1995 – 648) questionnaires were returned, that is 41% (in 1995 - 64%) of the total number of those to which the questionnaire was sent and 11.6% (in 1995 - 19%) of the total “population” which represented the basis for the selection of the sample.

#### **4. 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, gender and education were obtained from the Slovene Research Agency).

##### **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.* - In Slovenia in 2005 the majority (65%, in 1995 - 57%) of scientists with master's and doctor's degrees were concentrated within the biggest scientific institutions with 50 and more such scientists per institution (8% of all institutions). The distribution of the rest of the observed researchers with master's and doctor's degrees is presented in Table 1. For the sake of the method of selection of the surveyed persons (each third to fourth researcher within particular organisation) the same proportion of scientists with master's and doctor's degrees from all types of institutions/firms was included in the sample (28-29% - see Table 2). The only exceptions were institutions/firms with fewer than 3 such scientists.
- *The comparison of some structural characteristics* (gender, age, education, research field). - The structure of the sample and the population by all characteristics observed is very similar (see Table 3). There are only small differences: age – in the sample a little bit larger is the percentage of younger than 30 years and older than 50 years; gender – in the sample there is a little bit smaller share of women than in the population and vice versa is valid for men; (broader) research field – the strongest three fields in population (technical sciences, natural sciences, social sciences) are a little bit less represented in the sample.

---

<sup>5</sup> The process of selection of the surveyed persons was the following: The institutions/firms with researchers (with doctor's and master's degrees) registered at the Slovene Research Agency (323; in 1995 - 220) 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 1434 scientists each third to fourth (3.5) researcher was selected ( $5019/1434=3.5$ ) 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 had 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 5019 researchers.

**The comparison of the surveyed persons who responded to the questionnaire with the sample.** – 41% (1995 - 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. The response to the questionnaire was the greatest among the youngest and it decreases with the age of participants. Regarding the broader research field the response was the lowest among researchers from technical sciences and the highest among those from natural sciences.

**The comparison of the population with those scientists who responded to the questionnaire.** - As a result of the size of the sample (28%) and the willingness of the surveyed persons to collaborate in the survey (41% response; 1995 - 64%) we got the answers to the questionnaire from a very large part of all the Slovene scientists (one tenth – 12%; 1995 - 19%). The structure of scientists who filled in the questionnaire and of the whole population is almost the same as regards the level of education and the gender. The structure by the age and research field differs in similar way that we already mentioned in the comparison of respondents and the sample. On one side the respondents were on average a little bit younger than the population. On the other side researchers from technical sciences were a little bit less represented and those from natural sciences more represented than in the population.

**Country of obtaining the last/highest level of education.** – 90% of scientists in entire population obtained the last, highest level of education in Slovenia. For the rest the most representative countries of obtaining their last stage of education are: Croatia, Great Britain and USA.

**Table 1: “Population” - institutions/enterprises by the average and total number of researchers with master’s and doctor’s degree - Slovenia, 2005 and 1995**

| Number of researchers with M.A., M.Sc.,Ph.D. | 2005   |               |                                    |               | 1995   |               |                                    |               |
|--|--|---------------|------------------------------------|---------------|--|---------------|------------------------------------|---------------|
|  | Institutions/enterprises with researchers observed |               | Researchers with M.A., M.Sc.,Ph.D. |               | Institutions/enterprises with researchers observed |               | Researchers with M.A., M.Sc.,Ph.D. |               |
|  | Number   | Structure (%) | Number                             | Structure (%) | Number   | Structure (%) | Number                             | Structure (%) |
| - less than 5                                | 209  | 64.7          | 364                                | 7.2           | 121  | 55.0          | 211                                | 5.9           |
| - from 5 to 14                               | 52   | 16.1          | 420                                | 8.3           | 47   | 21.4          | 362                                | 10.2          |
| - from 15 to 29                              | 24   | 7.4           | 476                                | 9.4           | 23   | 10.4          | 486                                | 13.7          |
| - from 30 to 49                              | 12   | 3.7           | 501                                | 9.9           | 12   | 5.5           | 474                                | 13.4          |
| - from 50 to 99                              | 13   | 4.0           | 972                                | 19.2          | 10   | 4.5           | 785                                | 22.2          |
| - 100 and more                               | 13   | 4.0           | 2322                               | 45.9          | 7  | 3.2           | 1224                               | 34.6          |
| Altogether                                   | 323  | 100           | 5055                               | 100           | 220  | 100           | 3542                               | 100           |

Sources: Bevc et al., 1996; Bevc, Uršič, 2006.

**Table 2: The share of “population” in the sample – Slovenia, 2005 and 1995 (%)**

| Number of researchers with M.A., M.Sc., Ph.D | 2005  |                                     |                               |             | 1995  |                                     |                               |             |
|--|---|-------------------------------------|-------------------------------|-------------|---|-------------------------------------|-------------------------------|-------------|
|  | SAMPLE  |                                     | % OF POPULATION IN THE SAMPLE |             | SAMPLE  |                                     | % OF POPULATION IN THE SAMPLE |             |
|  | Number of institutions/enterprises (indirectly through researchers) | Number of researchers in the sample | Institutions/enterprises      | Researchers | Number of institutions/enterprises (indirectly through researchers) | Number of researchers in the sample | Institutions/enterprises      | Researchers |
| - less than 5                                | 100   | 104                                 | 47.8                          | 28.6        | 59  | 61                                  | 49                            | 28.9        |
| - from 5 to 14                               | 52  | 122                                 | 100                           | 29.0        | 47  | 102                                 | 100                           | 28.2        |
| - from 15 to 29                              | 24  | 134                                 | 100                           | 28.2        | 23  | 140                                 | 100                           | 28.8        |
| - from 30 to 49                              | 12  | 144                                 | 100                           | 28.7        | 12  | 134                                 | 100                           | 28.3        |
| - from 50 to 99                              | 13  | 278                                 | 100                           | 28.6        | 10  | 224                                 | 100                           | 28.5        |
| - 100 and more                               | 13  | 652                                 | 100                           | 28.1        | 7   | 351                                 | 100                           | 28.7        |
| Altogether                                   | 214   | 1434                                | 66.3                          | 28.4        | 158   | 1012                                | 72                            | 28.6        |

Sources: Bevc et. al., 1996; Bevc, Uršič, 2006.

**Table 3: The comparison of researchers who answered the questionnaire to the sample and the “population“ by some structural characteristics – 2005 and 1995 (%)**

| Characteristics of researchers                   | 2005       |        |  | 1995       |        |  |
|--|------------|--------|--|------------|--------|--|
|  | Population | Sample | Researchers who answered the questionnaire | Population | Sample | Researchers who answered the questionnaire |
| Education:                                       | 100        | 100    | 100  | 100        | 100    | 100  |
| ➤ Ph.D.  | 65.2       | 63.9   | 69.5                                       | 54.6       | 55.9   | 55.6                                       |
| ➤ M.A.,M.Sc.                                     | 34.8       | 36.1   | 30.5                                       | 45.4       | 44.1   | 43.4                                       |
| Gender:  | 100        | 100    | 100  | 100        | 100    | 100  |
| • men  | 64.6       | 66.3   | 63.2                                       | 71.5       | 71.8   | 71.7                                       |
| • women  | 35.4       | 33.7   | 36.8                                       | 28.5       | 28.2   | 28.3                                       |
| Age:   | 100        | 100    | 100  | 100        | 100    | 100  |
| ➤ 30 years or less                               | 6.5        | 7.9    | 17.9                                       | 5.5        | 4.8    | 5.9  |
| ➤ 31 to 40                                       | 40.7       | 40.2   | 32.9                                       | 35.6       | 34.7   | 37.5                                       |
| ➤ 41 to 50                                       | 33.1       | 31.3   | 39.4                                       | 29.7       | 33.2   | 33.7                                       |
| ➤ more than 50                                   | 19.6       | 20.6   | 9.8  | 29.2       | 27.3   | 22.9                                       |
| Broader research field:                          | 100        | 100    | 100  | 100        | 100    | 100  |
| ➤ <i>Technical sciences</i>                      | 31.4       | 32.2   | 21.7                                       | 29.6       |        | 30   |
| ➤ <i>Natural, medical, biotechnical sciences</i> | 40.8       | 40.4   | 49.2                                       | 45.7       |        | 47   |
| ➤ <i>Natural sciences</i>                        | 20.2       | 20.7   | 31.6                                       | 21.8       |        |  |
| ➤ <i>Medical sciences</i>                        | 12.7       | 12.1   | 8.0  | 17.2       |        |  |
| ➤ <i>Biotechnical sciences</i>                   | 7.9        | 7.6    | 9.6  | 6.7        |        |  |
| ➤ <i>Social sciences and humanities</i>          | 27.6       | 27.3   | 29.0                                       | 24.7       |        | 23   |
| ➤ <i>Social sciences</i>                         | 16.4       | 16.5   | 10.4                                       | 14.8       |        |  |
| ➤ <i>Humanistic sciences</i>                     | 11.1       | 10.7   | 17.1                                       | 9.9        |        |  |
| ➤ <i>Multidiscipl. sciences</i>                  | 0.1        | 0.1    | 1.5  |            |        |  |

Sources: Bevc et. al., 1996; Bevc, Uršič, 2006.

## **5. SOME MAIN CHARACTERISTICS OF SURVEYED RESEARCHERS IN SLOVENIA IN 2005 AND THE COMPARISON TO THE MID 90S**

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 and professional contacts with other countries (previous, current, planned future). Some main conclusions for 2005 in comparison to the situation in 1995 are:

- Demographic characteristics: lower percentage of men (65% to 72% for 1995).
- Professional characteristics: the structure by the scientific field was the following: 51% from natural, medical and biotechnical sciences, 22% from technical and 27% from social sciences and humanities (1995: 47%, 29%, 23%). The first and the third group were larger and the second smaller than in 1995. The majority of scientists (51%) were employed in institutions of higher education, but less than 10 years earlier (54%). 45% of the surveyed scientists had worked in the field of science up to 10 years (1995 - 40%), and 55% of them for a longer period (1995 - 60%); 36% of the surveyed persons had a leading position in the institution of their employment (1995 - 38%).
- Work conditions: on average they were similar than in the mid 90s; at that time they were better than in the majority of the other 9 former socialist countries observed.
- Hierarchy of values connected with work 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” for more than 50% of scientists) the Slovene scientists listed the following: professional fulfilment, good research infrastructure, availability of key publications and independence at work. The comparison with the situation in the mid 90s is the following: the majority of the respondents thought they would most probably achieve the majority of values (there are two exceptions: good research infrastructure and salary – the same results were obtained for the mid 90s) 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 mid 90s; the majority of researchers (65%) estimated their financial situation in the time of surveying (October 2005) as “we get along without any bigger financial problems”; the rest had as a rule only some small financial problems.

## 6. POTENTIAL EMIGRATION OF SLOVENE RESEARCHERS

### 6.1. THE EXTENT OF THE PHENOMENON

***The structure of the respondents by the probability of going abroad for the period of more than 1 year.*** - We defined three groups of scientists: “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 accepting the offer to go abroad for more than 1 year.
- Do you intend to go abroad 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 for more than 1 year. 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 64% and sure non-migrants 29%. The structure in the mid 90s was the following: 7%: 69%: 24%. Among the respondents in 2005 71% were potential emigrants (1995 – 76%), but most of them were hesitants (see Table 4).

**Table 4: The structure of the surveyed researchers by the probability of going abroad for more than 1 year – Slovenia, 2005 and 1995 (%)**

| Groups of respondents regarding the probability of going abroad for more than 1 year | 2005   |               | 1995   |               |
|--|--------|---------------|--------|---------------|
|  | Number | Structure (%) | Number | Structure (%) |
| <i>Potential emigrants</i>   | 384    | 70.9          | 495    | 76.6          |
| Sure migrants  | 40     | 7.4           | 46     | 7.3           |
| Hesitants  | 344    | 63.5          | 435    | 69.3          |
| <i>Sure non-migrants</i>   | 158    | 29.2          | 147    | 23.4          |
| ALTOGETHER   | 542    | 100           | 628    | 100           |

Sources: Bevc et al., 1996; Bevc, Uršič, 2006.

*The structure of potential (e)migrants regarding the intended period of staying abroad*<sup>6</sup> (see Table 5) - It is possible to distinguish the following three groups:

1. short-term (1-3 years) emigrants: 66% (sure - 17%, hesitants - 49%); in 1995 the share of these emigrants was higher (75%: sure – 20%, hesitants – 55%);
2. medium-term (4-5 years) emigrants: 13% (sure 4%, hesitants 8%); a higher share than in 1995 (10%: sure 1%, hesitants 9%);
3. long-term (more than 5 years) emigrants: 21% (sure 6%, hesitants 9%); a higher share than in 1995 (15%: sure 6%, hesitants 9%).

The propensity of the surveyed Slovene scientists (both - sure and hesitants) to medium-term and long-term emigration in 2005 was higher than in the mid 90s.

Despite the fact that the majority of potential emigrants present less possible (hesitant) short-term emigrants (49% of all respondents), relatively high is also the extent of potential (sure and hesitant) long-term and medium-term emigration (both presenting 34% of total potential emigration and 23% of all respondents; 1995 – 25% and 19% respectively). The percentage of very probable (sure) medium-term and long-term emigrants presents 10% of potential emigrants and 7% of all respondents (1995: 7% and 5% respectively). 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 of current decade would be much larger than was the real emigration in the period 1995-2004 (in this period: it accounted to 0.1% of the “population” per year; Bevc, Koman, Murovec, 2006).

---

<sup>6</sup> Only a part of potential emigrants is considered (37% of all potential Slovene emigrants; 1995 – 36%) since only a part of potential emigrants was "expected" to answer the question of the intended duration of being abroad.



**Table 5: The structure of potential emigrants in Slovenia in two dimensions: probability of going abroad for more than 1 year and the intended duration of staying abroad – in 2005 and 1995 (%)**

| Intended duration of staying abroad | 2005          |           |                                | 1995          |           |                                |
|-------------------------------------|---------------|-----------|--------------------------------|---------------|-----------|--------------------------------|
|                                     | Sure migrants | Hesitants | Potential emigrants altogether | Sure migrants | Hesitants | Potential emigrants altogether |
| <b>SLOVENIA</b>                     |               |           |                                |               |           |                                |
| 1 to 3 years                        | 17.5          | 49.0      | 66.4                           | 20.2          | 54.8      | 75.0                           |
| 4 to 5 years                        | 4.2           | 8.4       | 12.6                           | 0.6           | 9.5       | 10.1                           |
| 6 to 10 years                       |               | 3.5       | 3.5                            | 3.0           | 4.2       | 7.1                            |
| more than 10 years                  | 2.8           | 3.5       | 6.3                            | 0.6           | 1.8       | 2.4                            |
| forever                             | 3.5           | 7.7       | 11.2                           | 2.4           | 3.0       | 5.4                            |
| Altogether                          | 28.0          | 72.0      | 100                            | 26.8          | 73.2      | 100                            |
| <b>10 COUNTRIES IN TRANSITION</b>   |               |           |                                |               |           |                                |
| 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                            |

Sources: Bevc et al., 1996; Bevc, Uršič, 2006.

**Table 6: Estimated percentage of different categories of potential emigrants in total “population” of Slovene researchers with master’s and doctor’s degrees – 2005 and 1995 (%)\***

| Intended duration of staying abroad (in years) | 2005          |           |                                | 1995          |           |                                |
|--|---------------|-----------|--------------------------------|---------------|-----------|--------------------------------|
|  | Sure migrants | Hesitants | Potential emigrants altogether | Sure migrants | Hesitants | Potential emigrants altogether |
| 1 – 3  | 12.4          | 34.7      | 47.1                           | 15.4          | 42.0      | 57.5                           |
| 4 – 5  | 3.0           | 5.9       | 8.9                            | 0.5           | 7.3       | 7.8                            |
| 6 – 10   | 0.0           | 2.5       | 2.5                            | 2.2           | 3.2       | 5.4                            |
| more than 10                                   | 2.0           | 2.5       | 4.5                            | 0.5           | 1.4       | 1.8                            |
| Forever  | 2.5           | 5.4       | 7.9                            | 1.9           | 2.2       | 4.1                            |
| Altogether                                     | 19.8          | 51.0      | 70.8                           | 20.5          | 56.1      | 76.6                           |

Sources: Bevc et al., 1996; Bevc, Uršič, 2006.

\* The estimation is based on two assumptions: 1. that the structure of 37% (1995: 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” (5055 of researchers with master’s and doctor’s degrees).

## 6.2. 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 (statistically significantly) influence the probability of going abroad for more than 1 year. In the text that follows they are analysed in the 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 than others (1995 – same result). *Marital status* - single and divorced are more inclined to go abroad for more than 1 year than married (1995 – same result). *Number of children under 18* – those without children at all or without children under 18 years are more inclined to go abroad than others. Among the above-mentioned three factors number of children exerts the strongest influence – in 1995 the influence of age was the strongest. *Other* demographic factors (without statistically significant influence): *Sex* – men are more inclined to go abroad for more than 1 year than women in the region (in 1995 – women were more inclined to go). They are more inclined to sure and to less sure migration than women (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 doctor's degrees are more inclined to go abroad for more than 1 year than researchers with master's degrees (in 1995 – it was vice versa). *Broader scientific field* - Researchers from social sciences are more inclined to sure and less sure emigration for more than 1 year than other researchers (1995 – they also lead in the case of sure migration), and researchers from natural-mathematical sciences are besides this group more inclined to less probable emigration in comparison to other researchers (1995 – the highest propensity was the characteristic of technical sciences). *Narrower scientific field* (discipline) - The probability of sure migration is the highest among the researchers from the fields of geology, computer intensive methods and applications, transport, stomatology, neurobiology, sociology, law, linguistics and theology. The probability of less probable migration is the highest among the researchers from geology, environmental protection, production technologies and systems, constructions, oncology, economy and linguistics. *Employment* - The probability of sure migration is the highest among researchers from private higher education institutions and state research institutes (1995 – non-state research institutes), and the probability of less probable migration is the highest among researchers from enterprises without research units/departments. *Position within the organisation* - the propensity to leave the country for more than 1 year is the highest for researchers without any leading position within the institution (1995 – it was vice versa). *Number of years of working experience in sciences* – the propensity to sure migration is strongly connected with this characteristic of researchers (the propensity falls when number of years of working experience increases) and the propensity of less probable migration is not connected.

**Work conditions.** – Among the observed four conditions the following two have statistically significant influence on the probability of going abroad for more than 1 year: 1. necessity of dealing with tasks which could be carried out by less qualified fellows, 2. interest of the superiors in the problems the scientist is working on. In these two conditions the situation is

the worst for sure migrants and the best for sure-nonmigrants. The other two work conditions (participation in selection of the team members, 2. the availability of the required professional information) have no such influence. In 1995 results were different; at that time statistically significant influence was observed only for the ***availability of required professional information*** (a similar result was observed in the “region” of 10 countries as a whole).

**Hierarchy of values and their best realisation within the next 5 years.** - The *valuation* of the following 6 out of 11 values observed exerts an influence: ***career development, job security, professional fulfilment, recognition from colleagues, availability of key publications and salary*** (in 1995 only three of them had statistically significant influence: career development, salary, 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 job security. All 11 values observed except two (job security and prestige in society) are more important for sure migrants than for hesitants and sure non-migrants. *In the next 5 years* sure potential emigrants from Slovenia will (similarly than in 1995) achieve the majority of values observed to the greatest extent with the continuation of their work abroad (exemptions are: position in institutions, independence at work, prestige in society and information for research work), and sure non-migrants will achieve this to the highest extent by means of the continuation of scientific work within the country. The largest differences among the three groups of researchers have been observed for the following values: career development, salary and good research infrastructure.

**Demand for scientific work within the country.** – Similarly than in the mid 90s it has no statistically significant influence on the probability to leave the country for more than 1 year.

**Economic situation.** – We have observed different dimensions of financial situation of the surveyed researchers and of their family/households: financial situation in the time of surveying, change of financial situation since 2000, expected changes of this situation in period 2005-2007, share of the researcher's salary (for his/her scientific work) in the family income. Among them only ***financial situation in the time of surveying*** has shown statistically significant influence on the probability of going abroad for more than 1 year. In the time of surveying the financial situation was the worst for sure migrants and the best for sure non-migrants. Similarly than in the mid 90s during last few years before surveying (period 2000-2005) personal financial position of sure migrants had not changed (the financial situation of hesitants and sure non-migrants had slightly improved; the same was in the mid 90s). And expectations for the next few years (2005-2007) are for sure nonmigrants and hesitants lower from the changes during last few years and for sure migrants similar. In comparison to the mid 90s expectations of sure migrants are higher and expectations of other two groups lower. Share of the researcher's salary (for his/her scientific work) in the family income – despite

statistically nonsignificant influence it was **observed, that** the families of potential migrants (especially sure 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.

**Professional contacts with other countries in the current decade** (being abroad for different professional reasons). - Among different professional reasons for the number of visits of foreign countries (training, postgraduate, doctoral, postdoctoral study, joint research project/network, international conferences/workshops, short-time permanent employment) only **international conferences** exerts statistically significant influence on the probability of going abroad for more than 1 year (1995 - also for postgraduate study and doctoral study). When observing the duration of staying abroad **postgraduate study and joint research project** also exert an influence. Sure migrants went abroad more often (conferences) or stay abroad longer (postgraduate study, joint research projects) than less probable migrants (hesitants) and sure non-migrants. **Current work on joint research projects** – contrary to the mid 90s the probability of going abroad for more than 1 year is influenced by such work; it is higher among those who take part in such projects/networks than among others.

**Some characteristics of a planned stay abroad for more than 1 year.** - The following characteristics exert statistically significant influence: **reading advertisements in specialised foreign journals** (sure migrants are much more inclined to this step than less probable emigrants; in the mid 90s this was valid for seeking intermediate agency abroad), the **purpose of going abroad** (1995 – the same) - for both group of potential migrant the main purpose is work in research institutions or institutions of higher education, the **relation of management towards colleagues who are seeking ways of continuing their research work abroad** – the management is as a rule indifferent. Regarding the **country of destination** without statistically significant influence (1995 – it was) the following was observed: in both groups of potential emigrants (sure, hesitant) the most frequent countries of destination are the same, and at the same time same than 10 years ago - the USA, Germany; they are followed by Great Britain and Australia.

**Factors of dissuading from emigration.** - The following factors exert statistically significantly influence: **separation from the family, homesickness, loneliness, lack of social contacts and age.** - For sure migrants the majority of these factors are less important than for less probable migrants (hesitants). In comparison to the mid 90s the current situation is very different. The same is the key factor of dissuading from emigration – that is separation from the family; but its importance has decreased. Difference is in:

- number of factors with statistically significant influence (1995 – there were more such factors, besides separation from the family and homesickness also: health reasons, non-recognition of academic degrees and diplomas, administrative and legal problems with the local authorities) and
- in the strength of their influence – the importance of all factors observed is now lower than 10 years ago (exception is hostility to foreigners).

### 6.3. CHARACTERISTICS OF POTENTIAL EMIGRANTS REGARDING THE PLANNED DURATION OF THE STAY ABROAD

On the basis of a statistical analysis we assessed the factors which (statistically significant) influence the intended period of staying abroad. In the text that follows they are analysed in context of particular characteristics of respondents and are presented by bold italic characters; characteristics without statistically significant influence are presented by italic characters.

**Demographic characteristics.** - *Sex* – for period 6-10 years (in 1995 – 1 to 3 years) women are more inclined to go abroad than men, whereas for shorter or longer period of time men are more inclined to go abroad than women. *Marital status* - single researchers are more inclined to short-term, medium-term and long-term emigration than others (1995 – same). *Age* - similarly than in the mid 90s the youngest researchers (30 years and under) are more inclined to all types of emigration regarding the period of its duration. But contrary to situation in the mid 90s now the influence of age is the strongest in long-term emigration (1995 - short-term emigration). The youngest researchers (30 years and under) are much more inclined to this type of emigration than the older ones.

**Professional characteristics.** - *Level of education* - researchers with doctor's degrees are much more inclined to all different durations observed except to 6-10 years than researchers with master's degrees (1995 – opposite situation). *Year of obtaining the last/highest stage of education* – researchers who obtained this education in current decade (on average - the youngest), are more inclined to all different durations observed. *Country of obtaining the last stage of education* – researchers, who obtained this education abroad, are more inclined to long-term emigration than others. *Broader scientific field* - the scientists from natural-mathematical, technical and biotechnical sciences are inclined mostly to short-term migration, scientists from social sciences and humanities (with higher propensity to all different durations observed than other researchers) are especially inclined to migration for 4-5 years, and scientists from medical sciences (together with scientists from biotechnical sciences - lower propensity to all different durations observed than other researchers) are inclined mainly to migration longer than 5 years. A change in the propensity of researchers from different fields to short-, medium- and long-term migration has been observed in the period

1995-2005. In the mid 90s the propensity to short-term migration was the highest among researchers from social sciences and humanities, to medium-term migration (6-10 years) among researchers from natural, medical and biotechnical sciences, and the propensity to long-term emigration was the highest among researchers from technical sciences. *Narrower scientific field* - researchers from the following disciplines are inclined to emigration for a period longer than 6 years: pharmacy, biology, oncology, psychics, chemistry, biochemistry, computer intensive methods and applications, human reproduction, economy, sociology, political sciences, administrative and organisational sciences and sport. In the mid 90s the group of potential emigrants that were inclined to emigration for a period longer than 6 years consisted of scientists from electrotechnics, electronics, engineering, ecology, medicine, chemistry, chemical technology and biology. *Employment* – on general the propensity to emigration is the highest for researchers from the private higher education institutions; within this framework they are mostly inclined to long-term emigration. The propensity to short-term emigration is the highest for researchers from the public sector and to medium-term emigration for researchers from enterprises. In the mid 90s situation was different – researchers from higher education sector were the least inclined to all kinds of emigration regarding the period; within this framework they were mostly inclined to short-term emigration. The propensity to long-term emigration was 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* – to emigration for period longer than 5 years are mostly inclined less experienced researchers (especially those with 6-10 years of work experiences in science) and to emigration for shorter period are more inclined more experienced researchers (especially those with 11-20 years of such experiences). *Position within the organisation* - researchers without any leading position within the institution are more inclined to emigration for more than 10 years than those occupying such a position; the latter researchers are more inclined to shorter emigration.

**Work conditions.** – Among the conditions observed the intended period of staying abroad is statistically significantly connected only with the possibility of participation in selection of the team members. Those who would go abroad for a period of 4-10 years rarely have such possibility in the current job whereas other potential emigrants often have such possibility. The general conclusion considering all four conditions is that these conditions differ much less between short-term migrants and sure-nonmigrants than they do between other potential emigrants.

**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, salary, availability of information required for scientific work and job security. In the mid 90s the list of such values was longer; among them there were besides the first three of above-

mentioned values also the following: professional fulfilment, good research infrastructure, and modern way of life.

**Demand for scientific work within the country.** – All groups of potential emigrants regarding the period of their stay abroad in comparison to sure nonmigrants estimate that there is larger demand by foreign organisations/institutions and smaller demand by domestic state institutions/organisations.

**Economic situation/characteristics.** - *Financial situation of the researcher's family in the time of surveying* - it is better for short-term than for long-term emigrants (1995 – situation was vice versa). *Changes of the financial situation of the researcher's family in the period of the last five years* - for short-term and medium-term emigrants it has stayed unchanged, whereas for the long-term emigrants it has slightly improved. Compared to the mid 90s the evaluation of changes is better; at that time for short-term emigrants it has slightly improved and for the other potential emigrants it has on average deteriorated or remained unchanged. *Expected changes in the financial situation of the researcher's family for 2005-2007* - those who plan to stay abroad for 4-10 years, have the best expectations, and those who plan to stay abroad for more than 10 years, have the worst. On the other hand on average the majority of the different groups of researchers regarding the planned duration of staying abroad have better expectations for the future than has been their experience for the last five years.

**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 all groups regarding the intended period of staying abroad (except for the group of 4-10 years) the main step is to look for assistance from colleagues abroad. *Country of destination* - among those who plan to stay abroad for 1-5 years majority plan to go to the USA, Germany and Great Britain (the same as in 1995), among those who plan to go abroad for 6-10 years no specific country is more represented, and among those who plan to go abroad for more than 10 years or for good, besides the USA the most desired countries are: Benelux, Germany and Australia. For the majority of researchers the main *reasons for choosing a particular country* are better conditions for scientific work and knowledge of the language of the country. ***The purpose of staying abroad for more than 1 year*** - For short-term emigrants the main purpose is to work on joint research projects/networks, for medium-term emigrants and for those who intend to go abroad for more than 10 years or for ever to work at a research organisation or institution of higher education and for those who intend to go abroad for 6-10 years professional training. *Factors of dissuasion from leaving the country for more than 1 year* – For all groups of potential emigrants regarding the intended period of staying abroad the main factor is the separation from one's family (it would partly dissuade them from emigration). Other factors would have small or no influence on their decision/intention. For those who plan to go abroad

for more than ten years or for good, besides the separation from one's family, most important factors are: problems with employment of partner and/or schooling of children and non-recognition of academic degrees/diplomas. Among twelve factors observed only two have a statistically significant influence on the intended period of staying abroad: risk on missing favourable opportunities in the domestic country and problems at return to Slovenia.

## **7. CONCLUSIONS**

Brain drain from former socialist European countries has been very "hot" topic till mid 90s, especially before EU enlargement by 10 countries (2004). Within this phenomenon for different purposes, especially important is the brain drain of researchers as an important part of the human capital. Since no comparable international data exists on the topic, the European research project which covered 10 European countries in transition, was carried out in the mid 90s. It investigated the real and potential external and internal brain drain (of researchers) from this part of Europe. Slovenia was included in this project. In the mid of current decade both potential and real migration (for the period 1995-2004) were analysed again in Slovenia, using in the case of potential migration the same methodology as it was used in the mid 90s.

The paper presented the analysis of potential emigration of researchers from Slovenia in the year 2005 with an emphasis on the methodology of surveying and the results obtained. The questionnaire used in surveying was consistent with that used 10 years ago (in 10 countries included in international project on brain drain); the same is valid for the size of the sample (28%) and method of surveying. Random sampling (in 1995 among 10 countries it was used only in Slovenia) allows some generalisations for the total "population" of researchers in the country, and all three above-mentioned characteristics of surveying (questionnaire, size of sample, method of surveying) allow analysis of changes of the phenomenon in the period 1995-2005.

Potential external mobility of Slovene scientists is high, similarly than it was in the mid 90s, and regarding the structure of this mobility/migration the potential brain loss is also considerable. Since the situation in the Slovene science sector has improved during the last ten years it can be assumed that the danger of changes of high potential emigration of researchers into real emigration in near future is smaller than 10 years ago.

The profile of the potential long-term emigrant in 2005 was the following: single scientist (man or woman, the propensity to such emigration is similar for both, 10 years before it was higher for men), with PhD (10 years ago those with master's degree were more inclined to go), aged 30 years or less (10 years ago – aged between 30-35), who attained the last education degree abroad, from the natural-mathematical and social sciences (in 1995 - from



technical sciences), and was employed in private scientific institution (higher education institutions and research institutes); he/she would go abroad mainly for the reason of better conditions for scientific work and would work in scientific institution.

## 8. REFERENCES

- Bevc, Milena (1996). Potential external and internal brain drain – Slovenia, final report. National Report on COST A2 Project »Europe's Integration and Labour Force Brain Drain«. Ljubljana: Inštitut za ekonomska raziskovanja.
- Bevc, Milena, Valentina Prevolnik–Rupel, Barbara Verlič–Christensen (2000). Migration in Slovenia in the context of EU accession (original: Migracije v Sloveniji v luči vključitve v EU). Ljubljana: Inštitut za ekonomska raziskovanja.
- Bevc, Milena, Lukšič-Hacin, Marina, Zupančič, Jernej (2004). Migration policy and problem of brain drain (original: Migracijska politika in problem bega možganov). Ljubljana: Institute for Economic Research – Institute for Ethnical Studies.
- Bevc, Milena, Koman, Klemen, Murovec, Nika (2006). Human resources in research and development in Slovenia and a comparison with EU countries – assessment of the current situation and emigration (original: Človeški viri v razvojno-raziskovalni dejavnosti v Sloveniji in primerjava z državami Evropske unije – stanje in emigracija). Ljubljana: Institute for Economic Research.
- Bevc, Milena, Uršič, Sonja (2006). Potential external and internal brain drain of Slovene scientists in comparison to situation in the mid 90s (original: Pootencialni odliv človeških virov iz slovenske RRD v tujino in v druge dejavnosti v Sloveniji ter primerjava s stanjem sredi 90. let). Ljubljana: Institute for Economic Research.
- CEC (2001). A Mobility Strategy for the European Research Area, Commission Staff Working Paper. Brussels: Commission of the European Communities.
- CEC (2003). The Role of Universities in the Europe of Knowledge. Brussels: Commission of the European Communities.
- Cedefop (2004). Promoting Mobility in Europe. CEDEFOP-INFO, No 2, 2004.
- EC (2001). Key figures 2001: Indicators for Benchmarking of National Research Policies. Brussels: European Commission.
- EC (2002). Benchmarking National R&D Policies – Human Resources in RTD (STRATA-ETAN expert working group). Brussels: European Commission.
- EC (2003). Third European Report on Science&Technology Indicators, 2003. Brussels: European Commission, 2003.
- EC (2005). Key figures 2005: Towards a European Research Area – Science, Technology and Innovation. Brussels: European Commission.
- Eurostat (2004). Statistics on Science and Technology in Europe, 1999–2002. Luxembourg: Eurostat-European Commission.
- OECD (2002). Frascati Manual 2002. Paris: OECD.
- OECD (2002a). International Mobility of the Highly Skilled. Paris: OECD.
- OECD (2006). Trends in international migration: annual report 2006. Paris: OECD.
- OECD (2007). Education at a Glance – OECD indicators 2007. Paris: OECD.
- Predlog resolucije o Nacionalnem raziskovalnem in razvojnem programu za obdobje 2006–2010, Julij 2005. POIŠČI NA SPLETU KONČNO VERZIJO: kar RESOLUCIJA....
- Salt, J. (2005). Current Trends in International Migration in Europe. Council of Europe.
- World Bank (2006). Global Economic Prospects – Economic Implications of Remittances and Migration. Washington: World Bank.

**Paper for conference EALE 2007 - ABSTRACT**

**Milena Bevc, Sonja Uršič**

**POTENTIAL EMIGRATION OF SCIENTISTS FROM A SMALL NEW EU  
COUNTRY, SLOVENIA – CURRENT SITUATION AND TRENDS FROM THE MID  
90s**

**Institute for Economic Research, Kardeljeva ploščad 17, 1000 Ljubljana, Slovenia**

**ABSTRACT**

Emigration – especially of the most educated persons – is in most countries a very poorly registered phenomenon. The paper presents the methodology and the results of the analysis of potential emigration of researchers with master's or doctor's degrees from Slovenia in year 2005 compared to the mid 90s on the basis of the survey of these researchers. The analysis for 2005 was done within a research project carried out for the Slovene Ministry of Science whereas the analysis for the mid 90s was carried out within an international project on brain drain of researchers in 10 Eastern and Central European countries. For many reasons (use of random sampling, large sample - 1434 of researchers or 29% of “population”, high response - 41% etc.) the results are of great importance for the state policy in the science sector in Slovenia. The main result for the mid of the current decade is that the potential external mobility of Slovene scientists is, like in the mid 90s, high, and regarding the structure of this mobility/migration the potential brain loss (the percentage of the sure long-term emigrants among all potential emigrants and respondents) is also considerable.

Theme: Migration

**JEL-Code:** F22. J61. J62. R23

**Key words:** migration, brain drain, researchers, Slovenia

**European Population Conference 2008**

*Barcelona, Spain, 9-12 July, 2008*

**POTENTIAL EMIGRATION OF SCIENTISTS FROM A  
SMALL NEW EU COUNTRY, SLOVENIA  
Current situation and trends from the mid 90s**

**Milena Bevc, Sonja Uršič**

**Institute for Economic Research  
Kardeljeva ploščad 17, 1000 Ljubljana, SLOVENIA  
Tel.: (+386-1) 5303862  
Fax: (+386-1) 5303874  
Email: [bevc@ier.si](mailto:bevc@ier.si), [ursics@ier.si](mailto:ursics@ier.si)**