SOCIAL SCIENCES

MODELING THE MIGRATION OF UKRAINIANS TO STUDY ABROAD

Olesia Totska
PhD, Lesya Ukrainka Eastern European National University,
e-mail: o_totska@meta.ua, orcid.org/0000-0003-4748-2134, Ukraine

Abstract. The dynamics of the number of Ukrainians studying abroad in 2008–2016 has been analyzed. The projected models of these indicators for 2016–2019 for the eight countries of Western Europe, seven of Eastern Europe, five of North Europe, five of Southern Europe, four of partly European, two of North America and one of Australia and Oceania have been constructed. The forecast of the total indicator of Ukrainian students in the 32 countries of the world is forecast.

Keywords: international academic mobility, educational migration, countries of the world, forecasting models, trend lines.

DOI: http://dx.doi.org/10.23856/2801

Introduction

Recently more and more Ukrainian school graduates go to study abroad at higher educational institutions. This is due to the positive reputation and authority of foreign universities, the high quality of studies, the corresponding prices to it (sometimes lower than in Ukraine), good living conditions, the developed infrastructure of universities, the desire to learn foreign languages in the language environment of its natural carriers, the opportunity to see the world, expand the horizons, acquire new acquaintances, find a job and much more.

In addition, the lions of foreign students abroad are replenished by domestic students who, during their studies in Ukrainian universities, take part in various international exchange programs, double diplomas, etc. The regulation of such activities takes place through a number of regulatory acts. In particular, the Law of Ukraine «On Higher Education» deals with the following:

1) persons studying in higher education institutions are entitled to: ... academic mobility, including international (Article 62);

2) academic mobility – the opportunity for participants in the educational process to study, teach, practice or pursue scientific activities in another institution of higher education (scientific institution) on the territory of Ukraine or abroad (Article 1);

3) the central executive body in the field of education and science: ... develops a provision on the procedure for exercising the right to academic mobility and submits it for approval by the Cabinet of Ministers of Ukraine (Article 13);

4) applicants for higher education, who exercise the right to academic mobility, while studying, practice or pursuing scientific activity in another institution of higher education (scientific institution) on the territory of Ukraine or abroad, it is guaranteed the preservation of the place of study and the payment of scholarships in accordance with the provision on the

procedure for implementing the right to academic mobility. Such persons are not deductible from the composition of applicants for higher education (Article 46);

5) in order to create conditions for international academic mobility, a higher education institution has the right to decide on the teaching of one or more disciplines in English and / or other foreign languages, while ensuring knowledge of the relevant discipline in the state language by the students of higher education (Article 48);

6) in order to develop international cooperation in the field of higher education and integrate the higher education system into the world educational space, the state promotes: ... the harmonization of the National qualifications framework with the framework of qualifications of the European higher education area for the provision of academic and professional mobility and lifelong learning; cooperation with the European network of national information centers on academic mobility and recognition (Article 74).

In the position of the Cabinet of Ministers of Ukraine «On the Procedure for Implementation of the Right to Academic Mobility», which was mentioned earlier, international academic mobility is defined as academic mobility, the right to which is implemented by domestic participants in the educational process in higher educational institutions (scientific institutions) – partners outside Ukraine, and also foreign participants in the educational process in domestic higher educational institutions (scientific institutions).

At the same time, Article 75 of the Law «On Higher Education» states, that the main directions of international cooperation of institutions of higher education, among other things, are:

– participation in programs of bilateral and multilateral intergovernmental and inter-university exchange of students, post-graduate students, doctoral students, pedagogical, scientific-pedagogical and scientific workers;

– sending people studying in higher education institutions of Ukraine to study abroad at higher education institutions;

– promotion of academic mobility of scientific, scientific-pedagogical workers and persons studying, etc.

As you can see, Ukrainian citizens can participate in horizontal academic mobility– studying for a limited period at a foreign institution of higher education, and in the vertical one – to take a full course of study abroad, if they are attracted by the quality and price of educational services provided by local educational institutions.

Issues of educational migration were highlighted in the writings of such Ukrainian scholars, as O. S. Grinkevich, L. A. Zhurakovska, V. I. Kutsenko, N. P. Rudenko, L. K. Semiv, V. M. Cherba, G. D. Tobol, D. V. Mushkatiorova and others. In particular, they investigated the institutional environment and trends of state regulation of educational migration in Ukraine and the world *(Grinkevich, 2013)*, the trends of educational migration in the context of globalization of economic development *(Zhurakovska, 2014)*, socio-economic and professional aspects of educational migration *(Kutsenko et al., 2010)*, educational migration as a factor in the development of territorial migration systems in the national and European context *(Semiv, 2013)*, the causes of educational migration of Ukrainian students abroad *(Cherba et al., 2017)*. In addition, analytical researches in this area were carried out by analytical center CEDOS. But a comprehensive prediction study of educational migration of Ukrainians abroad with the use of mathematical apparatus was not implemented. Our article is intended to fill this gap.

The aim of the study is to build predictive models of Ukrainian migration for studying abroad. Since the State statistics service of Ukraine does not keep records of Ukrainian

citizens, who are educated abroad, the necessary statistics for 2008–2016 we will take in one of the publications *(Stadniy, 2017)*. In particular, we will analyze the available there information on the number of Ukrainian students in full-time study in 32 countries of the world, mostly European:

1) Western Europe (8): Austria, Belgium, France, Germany, Ireland, Netherlands, Switzerland, United Kingdom;

2) Eastern Europe (7): Belarus, Bulgaria, Czech Republic, Hungary, Moldova, Poland, Slovakia;

3) Northern Europe (5): Estonia, Finland, Latvia, Lithuania, Sweden;

4) Southern Europe (5): Croatia, Italy, Serbia, Slovenia, Spain;

5) partially European (4): Azerbaijan, Georgia, Russia, Turkey;

6) North America (2): Canada, USA;

7) Australia and Oceania (1): Australia.

As the analysis of the actual data from the table 1 (columns 1–10) shows, the most popular among Ukrainian students are countries, such as Austria, Canada, Czech Republic, France, Germany, Hungary, Italy, Poland, Russia, Spain, USA. After all, in recent years in each of them more than 1 thousand Ukrainian citizens studied. Moreover, the share of Poland (45,53 %), Germany (13,77 %) and Russia (10,51 %) in 2015–2016 were highest, indicating these countries as leaders of Ukrainian studies. The least attractive from the point of view of Ukrainians is Azerbaijan, Croatia, Georgia, Ireland, Serbia, Slovenia, where in recent years less, than 50 people from Ukraine studied. And in Serbia this indicator in the last year stopped at 0.

To get the forecast data of educational migration, first we will construct for each country and the total number of students of Ukrainians abroad five trend lines:

1) exponential: $y = a_0 e^{a_1 x}$;

2) linear: $= a_0 + a_1 x$;

3) logarithmic: $y = a_0 + a_1 \ln(x)$;

4) polynomial (power = 2): $y = a_0 + a_1 x + a_2 x^2$;

5) power: $= a_0 x^{a_1}$.

Of these, let's leave one, that has the greatest value of the accuracy of the approximation R^2. The resulting forecasting models will look like this:

1) Australia: $y_1=2{,}8512x^2-9{,}244x+60{,}018$ ($R^2=0{,}9592$);

2) Austria: $y_2=-0{,}8274x^2+125{,}6x+627{,}77$ ($R^2=0{,}9846$);

3) Azerbaijan: $y_3=8{,}1681x^{0{,}5651}$ ($R^2=0{,}398$);

4) Belarus: $y_4=5{,}381x^2-39{,}095x+236{,}46$ ($R^2=0{,}741$);

5) Belgium: $y_5=-2{,}5714x^2+37{,}167x+64{,}321$ ($R^2=0{,}9343$);

6) Bulgaria: $y_6=2{,}3155x^2+21{,}435x+247{,}62$ ($R^2=0{,}998$);

7) Canada: $y_7=27{,}387x^2+58{,}649x+638{,}34$ ($R^2=0{,}9924$);

8) Croatia: $y_8=-0{,}3512x^2+4{,}5536x-2{,}4107$ ($R^2=0{,}9054$);

9) Czech Republic: $y_9=10{,}661x^2+89{,}994x+915{,}8$ ($R^2=0{,}972$);

10) Estonia: $y_{10}=5{,}4345x^2-38{,}256x+170{,}45$ ($R^2=0{,}8497$);

11) Finland: $y_{11}=114{,}82x^{0{,}1988}$ ($R^2=0{,}5194$);

12) France: $y_{12}=-3{,}1071x^2+17{,}631x+1368{,}4$ ($R^2=0{,}1945$);

13) Georgia: $y_{13}=1{,}0119x^2-6{,}7976x+17{,}286$ ($R^2=0{,}6267$);

14) Germany: $y_{14}=13x^2+10{,}19x+8151{,}9$ ($R^2=0{,}9843$);

Table 1

Number of Ukrainian students abroad on a day-time basis

No by order	Country	Actual data								Forecast data		
		2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
1	Australia	48	61	62	69	68	113	144	164	208	253	303
2	Austria	727	905	990	1142	1265	1279	1460	1607	1691	1801	1909
3	Azerbaijan	7	19	13	11	46	12	21	36	28	30	32
5	Belarus	186	182	196	181	168	164	215	290	320	384	458
4	Belgium	109	114	156	161	194	206	194	194	191	179	162
6	Bulgaria	275	296	333	367	411	463	519	561	628	694	764
13	Canada	719	919	1052	1202	1609	2046	2468	2790	3385	3964	4597
29	Croatia	3	4	8	9	12	13	14	10	10	8	5
30	Czech Republic	913	1249	1336	1477	1584	1772	2015	2395	2589	2882	3196
9	Estonia	121	127	119	118	106	117	157	230	266	331	407
27	Finland	114	123	145	180	178	125	166	184	178	181	185
28	France	1349	1388	1447	1482	1282	1320	1332	1348	1275	1234	1186
8	Georgia	9	5	16	5	11	7	13	34	38	51	65
18	Germany	8121	8307	8305	8379	8521	8671	8842	9088	9297	9554	9837
26	Hungary	829	896	862	763	803	807	1003	1026	1152	1295	1463
10	Ireland	13	15	18	9	14	14	12	26	27	33	40
12	Italy	800	1043	1314	1556	1727	1894	2200	2348	2535	2711	2877
14	Latvia	61	259	214	183	188	233	196	233	269	282	295
15	Lithuania	97	108	111	126	232	170	236	361	410	498	596
16	Moldova	271	235	202	157	165	164	160	139	161	178	201
17	Nether-lands	87	79	96	97	103	111	130	156	175	202	232
19	Poland	2831	3499	4879	6321	9620	14951	22833	30041	39518	50314	62506
20	Russia	2773	4756	2578	4644	4737	3330	5858	6936	7679	8950	10386
21	Serbia	9	8	10	3	4	8	9	0	2	1	0
22	Slovakia	71	84	98	109	128	176	389	683	876	1171	1511
23	Slovenia	10	14	19	26	25	27	33	46	41	44	47
11	Spain	558	641	840	1114	1323	1418	1545	1612	1732	1802	1854
32	Sweden	259	253	429	422	295	139	129	145	-56	-209	-386
31	Swit-zerland	242	262	279	282	283	297	312	332	340	353	367
25	Turkey	209	198	208	232	282	363	429	464	577	681	798
7	United Kingdom	385	450	505	615	710	835	835	820	886	903	909
24	USA	1716	1727	1583	1535	1490	1464	1551	1680	1760	1907	2088
Total		23922	28226	28423	32977	37584	42709	55420	65979	78106	92530	108701

15) Hungary: $y_{15}=12{,}185x^2-88{,}363x+960{,}55$ ($R^2=0{,}6847$);
16) Ireland: $y_{16}=0{,}5298x^2-3{,}9464x+19{,}375$ ($R^2=0{,}4173$);
17) Italy: $y_{17}=-4{,}5238x^2+261{,}33x+549{,}61$ ($R^2=0{,}9963$);
18) Latvia: $y_{18}=101{,}06x^{0{,}4464}$ ($R^2=0{,}4682$);
19) Lithuania: $y_{19}=5{,}4583x^2-16{,}137x+113{,}55$ ($R^2=0{,}8676$);
20) Moldova: $y_{20}=3{,}3155x^2-46{,}565x+311{,}62$ ($R^2=0{,}9358$);
21) Netherlands: $y_{21}=1{,}7202x^2-6{,}0893x+90{,}911$ ($R^2=0{,}9626$);
22) Poland: $y_{22}=697{,}86x^2-2463{,}4x+5161{,}9$ ($R^2=0{,}9964$);
23) Russia: $y_{23}=83{,}024x^2-306{,}74x+3714{,}7$ ($R^2=0{,}5836$);
24) Serbia: $y_{24}=-0{,}0536x^2-0{,}2679x+8{,}9464$ ($R^2=0{,}2682$);
25) Slovakia: $y_{25}=22{,}286x^2-128{,}4x+226{,}79$ ($R^2=0{,}9409$);
26) Slovenia: $y_{26}=9{,}3692x^{0{,}6681}$ ($R^2=0{,}946$);
27) Spain: $y_{27}=-9{,}4226x^2+249{,}58x+248{,}55$ ($R^2=0{,}9829$);
28) Sweden: $y_{28}=-12{,}375x^2+82{,}625x+202{,}62$ ($R^2=0{,}5979$);
29) Switzerland: $y_{29}=0{,}2321x^2+9{,}0417x+239{,}52$ ($R^2=0{,}948$);
30) Turkey: $y_{30}=6{,}2798x^2-15{,}387x+207{,}23$ ($R^2=0{,}9762$);
31) United Kingdom: $y_{31}=-5{,}506x^2+121{,}64x+237{,}41$ ($R^2=0{,}9578$);
32) USA: $y_{32}=16{,}571x^2-167{,}4x+1924$ ($R^2=0{,}8224$);
33) total: $y_{33}=873{,}52x^2-2173{,}2x+26910$ ($R^2=0{,}9892$).

It should be noted, that among the 33 received trend lines, four were power (for Azerbaijan, Finland, Latvia, Slovenia), 29 – polynomials (for the remaining 28 countries and the general indicator). The accuracy of the approximation R^2 was different and fell into the following ranges:

> 0,9 – for 18 countries and the total (Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Germany, Italy, Moldova, the Netherlands, Poland, Slovakia, Slovenia, Spain, Switzerland, Turkey, United Kingdom);
> 0,8 – for three countries (Estonia, Lithuania, USA);
> 0,7 – for one country (Belarus);
> 0,6 – for two countries (Georgia, Hungary);
> 0,5 – for three countries (Finland, Russia, Sweden);
> 0,4 – for two countries (Ireland, Latvia);
> 0,3 – for one country (Azerbaijan);
> 0,2 – for one country (Serbia);
> 0,1 – for one country (France).

As we can see, for most countries, the parameter R^2 was close to one, which indicates a stable dynamics of indicators and the adequacy of constructed forecast models.

Based on the received trend lines, we will form forecasts for 2016–2019 (last three columns in table 1).

Conclusions and suggestions

The analysis of the forecast data shows, that in 27 countries the number of Ukrainian students is expected to increase. In addition, the total indicator of educational migration from Ukraine will grow, which will amount to 78106 people in 2016–2017, 92530 – in 2017–2018 and 108701 – in 2018–2019, respectively. A decrease in the presence of Ukrainians will be observed only in higher education in Belgium, Croatia, France, Serbia and Sweden. In other words, educational migration from Ukraine in the coming years will increase its turn. Given

this situation, it is advisable for domestic higher educational institutions to improve the efficiency of their vocational guidance work, the quality of teaching disciplines, review pricing policies, develop infrastructure, strengthen cooperation in terms of participation in bilateral and multilateral student exchange programs, promote their international academic mobility, etc. As for further research in this area, they can be carried out with the expansion of the number of analyzed countries.

References

Cherba, V. M. et al. (2017). The Causes of educational migrations of Ukrainian students abroad. Investments: practice and experience, 12, 68–72. [in Ukrainian].

Grinkevich, O. S. (2013). Educational migration in Ukraine and the world: institutional environment and trends of state regulation. Socio-economic problems of the modern period of Ukraine, 3, 254–264. [Electronic resource]. Retrieved from http://nbuv.gov.ua/UJRN/sepspu_2013_3_28. [in Ukrainian].

Kutsenko, V. I. et al. (2010). Educational migration: socio-economic and professional aspects. Regional economics, 1, 123–130. [Electronic resource]. Retrieved from http://nbuv.gov.ua/UJRN/regek_2010_1_18. [in Ukrainian].

Law of Ukraine «On Higher Education», 01.07.2014, no. 1556-VII (edition dated 01.01.2018). [Electronic resource]. Retrieved from http://zakon5.rada.gov.ua/. [in Ukrainian].

Semiv, L. K. (2013). Educational migration as a factor for the development of territorial migration systems: national and European context. Socio-economic problems of the modern period of Ukraine, 3, 244–253. Retrieved from http://nbuv.gov.ua/UJRN/sepspu_2013_3_27. [in Ukrainian].

Stadny, Ye. (2017). Ukrainian students abroad: facts and stereotypes. [Electronic resource]. Retrieved from https://cedos.org.ua/uk/osvita/ukrainski-studenty-za-kordonom-fakty-ta-stereotypy. [in Ukrainian].

The provision approved by the CMU «On the Procedure for Implementation of the Right to Academic Mobility», 12.08.2015, no. 579. [Electronic resource]. Retrieved from http://zakon3.rada.gov.ua/. [in Ukrainian].

Zhurakovska, L. A. (2014). Trends of educational migration in the context of globalization of economic development. Demography and social economics, 1, 234–242. [Electronic resource]. Retrieved from http://nbuv.gov.ua/UJRN/dse_2014_1_22. [in Ukrainian].