Research in Educational Administration & Leadership

Volume: 8, Issue: 2 / June 2023

Brain Drain from Türkiye: Register Evidence of Non-Returning Graduates

Furkan Metin*

Turkish Statistical Institute, Ankara, Türkiye

Abstract

Globalisation of labour has led to the migration of skilled workforce; known as 'brain drain'. To our knowledge, this paper is the first study which analyses brain drain from Türkiye through administrative register evidence of non-return bachelors' degree graduates. The analysis micro dataset in the paper is based completely upon administrative registers of public institutions of Republic of Türkiye. These public institutions including Ministry of Interior, Directorate-General for Population and Citizenship Affairs for residence abroad data, and Council of Higher Education of Türkiye (CoHE) for higher education data. The results were analysed through descriptive statistics. The results indicate that brain drain rate of bachelor's degree graduates is 3.23 per cent in the year 2020. The rate is calculated through considering 55,918 non-return graduates out of total number of 1,730,955 graduates. The most popular destinations to brain drain from Türkiye are the United States of America with 22.4 per cent, Germany with 14.3 per cent and the United Kingdom with 11.6 per cent. When it comes to gender distribution, brain drain rate of males is 3.62 per cent and it is 2.84 per cent for females. The results indicated that brain drain rate of bachelor's degree graduates increased more than 50% between the years 2011 and 2020. Therefore, future research is need to investigate the reason behind the high increase rates in brain drain from Türkiye. Residence abroad data used in this paper is based on the statements of Turkish bachelor's degree graduates reside abroad. Therefore, the actual number may even be higher than the figures here.

Article Info

Article History:
Received: July 27, 2022
Accepted: December 23, 2022

Keywords:
brain drain, higher education, skilled human resources, human capital

*Corresponding author
E-mail: furkanmetin@gmail.com

Cite as:

Metin, F. (2023). Brain drain from Türkiye: Register evidence of non-returning graduates. *Research in Educational Administration & Leadership*, *8*(2), 373- 419. https://doi.org/10.30828/real.1149770

Introduction

Individuals may feel the need to change their country of residence due to various economic, political, social, demographic, cultural, technologic, climatic reasons in the country where they live or the country, they are planning to reside in. These reasons may also be due to personal preferences as well, such as the desire to work or study or to spend their retirement life abroad (Aksoy, 2012). With globalisation, the barriers preventing individuals from changing the country they live in have begun to decrease. The global mobility of people phenomenon, whether temporary or permanent, could be considered a significant manifestation of the internationalisation of professions and professional labour markets (Baruch et al., 2007).

The fact that migration of highly-skilled professionals is the category of migration share of which has increased most among international migration categories in recent years. This may be due to the fact that internationalisation of labour markets and increasing demand for highly skilled professionals particularly in developed countries. These countries are in a kind of race and develop several strategies to attract highly qualified workforce. This is due to the fact that permanent migration of these professionals is considered one of the significant factors for economic growth and innovation (Bailey and Mulder, 2017). It is also a sort of free transfer of human capital from

origin countries to destination countries (Köser-Akçapar, 2006). The international transfer of human capital also refers to the term of brain drain. Brain drain mainly applies to the migration of relatively highly educated individuals from developing countries to the developed ones (Beine et al., 2001).

The non-return of tertiary students, as highly-skilled individuals, to their home countries after completing their studies abroad is one type of brain drain (Baruch et al., 2007). International tertiary students are students who leave their country of origin and move to another country for short-cycle tertiary education or bachelor's or master's or doctoral level education (OECD, European Union, UNESCO Institute for Statistics, 2015). Much literature situates international tertiary student mobility in the context of "knowledge society" (Gökbayrak, 2008), "human capital theory" (Atmaca, 2020; Güngör & Tansel, 2007; Köser-Akçapar, 2006; Özden & Schiff, 2006) or "economic theory" (Aytaç & Aydın, 2019; Docquier & Rapoport, 2012; Kahanec & Králiková, 2011) in which the positive effects of high-skilled migration on both society and economy argued. High-skilled individuals may well facilitate changes of ideas and knowledge to a greater extent compared to low-skilled migration due to their higher productive capacity gained through greater education and skills training (Kahanec and Králiková, 2011). In this regard, the human capital explanation assumes that increasing international student mobility is linked to the rising demand for high-skilled professionals with tertiary education. The rising global demand prompts many students particularly in developing countries to seek education and work opportunities abroad (Portnoi et al., 2010).

As an emerging country, there have been several number of studies about the brain drain from Türkiye (Aksoy, 2012; Atılgan, 1986; Atmaca, 2020; Aytaç and Aydın, 2019; Bakırtaş and Kandemir, 2010; Başaran, 1972; Dudu and Rojo, 2022; Elveren and Toksöz, 2019; Erkal, 1980; Gülmez, 1974; İyi, 2020; Kaya, 2019; Köser-Akçapar, 2006; Özçürümez and Yetkin Aker, 2016; Rüzgar, 2020; Tanrısevdi et al., 2019; Tansel and Güngör, 2003; Tezcan, 1971; Yılmaz, 2020). Nevertheless most of these papers are lacking empirical data and more significantly none of these papers used administrative registers to evalute brain drain from Türkiye. This paper is the first study which analyses the brain drain from Türkiye through administrative register evidence of non-return bachelor degree graduates.

As a result of this research, the brain drain rate of Türkiye by year, by gender, by countries and by departments are revealed through analysing the educational and residential micro data sets of 55,918 non-return graduates out of total number of 1,730,955 bachelor's graduates. Overall, this paper focuses mainly on four research questions:

- What makes brain drain more likely?
- What is the "brain drain" rate of Türkiye for bachelor's graduates by years?
- Which countries have the most bachelor's degree immigrants from Türkiye?
- In which educational fields, "brain drain" from Türkiye reaches the highest scores?
- Is there a gender gap in "brain drain" from Türkiye?

Brain Drain and Human Capital

The term 'brain drain' was coined firstly within a report by the Royal Society of London in 1963 in the context of emigration of British scientists to the United States and Canada in the early 1960s (Gibson and McKenzie, 2011). Brain drain refers to the international transfer of human capital and mainly applies to the migration of relatively highly educated individuals from developing countries to the developed ones (Beine et al., 2008). Brain drain can also be defined as the movement of highly qualified individuals from their home countries to more developed countries in order to have more professional opportunities, to gain further qualifications, to work in a dynamic environment, to have more income and status (Köser-Akçapar, 2006; Latukha et al., 2021). Apart from that, as opposed to the majority of migration types, brain drain is a kind of selective process. Skilled people without any necessity to migrate, do so because they perceive opportunities from abroad (Lee, 1966).

Brain drain could be classified into three dimensions: 'brain export', 'hidden brain drain' and 'virtual brain drain'. Brain export is one of the most common types of brain drain, meaning exporting skilled and well-qualified brains to another country physically. Another dimension is the hidden brain drain, implying the working of individuals in their domestic countries but for multinational enterprises. Virtual brain drain is a kind of remote working of individuals without changing their residence for a developed country (Yılmaz, 2020). This type of brain drain has gained popularity, particularly after the outburst of Covid-19 pandemic.

The non-return of international tertiary students to their home countries after completing their studies abroad is one type of brain export (Baruch et al., 2007). These immigrants may continue working in the destination country after the completion of their studies or may return to their home country. According to a joint paper released by ILO, OECD and the World Bank in 2015, the share of skilled immigrants compared to all other migrant groups has been continuously increasing and by 2011. According to the paper, 30 per cent of 15 and over years old migrants in the OECD had tertiary education corresponding to 31 million persons with an increase of 70 per cent over the past ten years (Bailey and Mulder, 2017).

'Human capital flight' has also been used by various scholars interchangeably (Atmaca, 2020; Baruch et al. 2007; Beine et al. 2001; Gökbayrak, 2008; Köser-Akçağar, 2006; Sağırlı, 2006) notwithstanding the recent popularity of the term 'brain drain'. Human capital is composed of the knowledge, skills and health that people accumulate over their lives; enabling them to realise their potential as productive members of their society (The World Bank, 2019). It can be defined as a transformation of relevant inputs; such as formal and non-formal education, and health; to a factor of production. Not only governments, but also private sector and households make substantial expenditures on education, health, social protection and so forth to accelerate the formation of human capital. According to Haque and Kim (1995), brain drain reduces the growth rate of the effective human capital remaining in the domestic economy and hence generates a permanent reduction of per capita growth for source countries. On the other hand, skilled migration is considered one of the significant factors for economic growth and innovation by destination countries

(Bailey and Mulder, 2017). As a result, the consequences of the brain drain may vary depending on which side of the migration countries are on, sender or receiver.

The Consequences of Brain Drain for Origin and Destination Countries

There has been a controversy for origin countries with regard to the consequences of brain drain and the outcomes are classified under 'optimistic' and 'pessimistic' approaches (Latukha et al., 2021). Brain drain denotes that the origin country exports its researchers, scientists and skilled labour at almost zero gain and the destination country imports this qualified population free of charge. These researchers or practitioners emigrate to more developed countries having vast opportunities due to a variety of reasons, however when they do not return to their home countries to make use of their experiences and know-how; these origin countries face serious loss of human capital (Docquier and Rapoport, 2004; Tanrısevdi et al., 2019; Bakırtaş and Kandemir, 2010).

From the perspective of the destination countries; these countries develop and implement policies to support brain gain due to generating positive effects on the country at large. The destination countries have possible positive and negative impacts of brain gain regarding science and technology, higher education systems and labour markets (Kahanec and Králiková, 2011). Research and development, and economic activities with high value-added are expected to increase in line with the advance of the highly skilled labour force within the country. Ensuring communication and reciprocal information flow, and establishing cooperation with the

origin country are other possible positive effects for destination countries. Enhancement of creativity by means of cultural diversity arising from the skilled migration (Sağırlı, 2006).

Apart from these, even though brain drain is a "drain" for the home country, it may not always be a complete "gain" for the destination country. Indeed, high-skilled immigrants have the potential to benefit the host regions through contributing to the growth in the production of goods and services. Nevertheless, economic productivity in the host country may not grow along with it (Constant, 2014). In the case of highly skilled immigrants and native workers have complementing skills, then immigration rises labour demand, which results in higher wages and employment of natives. On the other hand, if highly skilled immigrant workers have substitute skills with native workers, then immigration rises labour supply which results in lowering wages and employment level of native-born workers (Viseth, 2020). In fact, even though some immigrants have high level of educational attainment in their home countries, they predominantly find inequivalent jobs in the destination country. Thus, these highly skilled immigrants may enter low-skilled jobs that do not fully utilise their skills, hence downskilling problems may arise. Skill mismatches may result in lower employment probability of immigrants, which in turn increases the need of unemployment benefits overall. Institutional barriers such as poor or complicated recognition of degrees, insufficient knowledge of the host country language (Barbone, Kahanec, Kureková, & Zimmermann, 2013) or discriminatory hiring practices for immigrants (Lerner, 1994) are some of the reasons for downskilling.

The term 'brain drain' is still widespread, nevertheless the phenomenon of 'brain circulation' has also become popular within the framework of human capital flows. Since the last two decades, a growing brain circulation literature argue that negative effects of outflow of high skilled individuals may lead to positive outcomes in the case of returning these migrants to their home countries. Therefore, it is significant for the origin country governments to build and utilise the policies to supplement return migration policies and practices. While brain drain causes a difference between origin and destination countries in terms of growth, brain circulation is argued to minimize the difference. When qualified programmes that encourage return are achieved, benefits of the brain circulation come to the forefront in terms of the origin country (Güngör and Tansel, 2007; İnce, 2020). Negative impacts of brain drain to the origin country may be eliminated through transfers of knowledge, technology and investment in case of building diasporas in the destination countries if a short-term and continuous brain circulation could be ensured (Docquier and Rapoport, 2004; Gökbayrak, 2008).

Country Strategies to Attract Highly Qualified Human Resources

Industrialised countries are in a kind of global race to introduce policies with the purpose of facilitating the recruitment of highly skilled individuals from abroad. Meanwhile, attracting highly skilled migrants means more than facilitating work permits. Countries with widely spoken languages or organisations using an international language and offer high wages are more likely to attract migrants compared to the countries with its own unique language and moderate wages (Chaloff & Lemaître, 2009).

The main strategies to attract highly skilled migrants are as follows; (a) employer-oriented selection strategy, (b) sector-based selection strategy, and (c) individual human capital scoring strategy. In the employer-oriented strategy, recruitment processes such as preparing the documents for obtaining visas, work and residence permits on the behalf of migrants are carried out by employers. The H-1B visa type applied in the USA is one of the examples of employer-oriented selection strategy. In the sector-based selection strategy, priority sectors that need qualified workforce are determined by countries. Employment incentives are arranged by governments to facilitate the recruitment of highly skilled migrants in the identified sectors. The German Green Card application, which was prepared for the information technologies sector in Germany in the early 2000s, can be given as an example. In the individual human capital scoring strategy, governments use several ranking systems to assess skills, education, language ability, work experiences and other profiles of candidate foreign migrants. This method is applied mainly by Canada, the United Kingdom and the Czech Republic (Sarcan, 2022).

Apart from these, the reasons of changing the country of residence of professional labours may depend on various reasons in the origin or destination country. In the coming section these factors are explained through push and pull factor approach.

Push and Pull Factors

Lee (1966) suggests that the factors in the act of migration is determined by factors associated with the area of origin and destination, intervening obstacles, and personal factors. In this sense, 'the push-pull model' covers a wide range of factors that play a role in

the decision making process to migrate with numerous advantages and disadvantages (Kaya, 2019).

Better living conditions, higher wages, merit-based working environments, career development opportunities, and facilities for research and development can be considered as pull factors (Martiskova, 2013). One of the most significant pull factor is the abundance of research opportunities within developed countries when compared to origin country of the researchers. Research and development expenditures may be a relevant indicator so as to observe this statement. Israel (5%), Republic of Korea (4.8%), Sweden (3.3%), Austria (3.2%), Germany (3.1%) and the United States of America (2.8%) are the countries spending almost three or more percentages of their gross domestic products (GDP) on research and development (The World Bank, 2021). Thus, these countries are more likely to attract researches from other countries.

Pull factors are those of the receiving country providing incentives for individuals to settle down in the receiving country; while push factors are the circumstances or conditions that prompt them to emigrate (Güngör and Tansel, 2007). Unemployment in home country, skill or educational mismatches, lack of career opportunities, limited research or working facilities, political and legal uncertainties and prevalence of nepotism/cronyism within labour market can be regarded as push factors for emigration of qualified labour force. Pull and push factors can be summarised in Figure 1 as follows.

Factors Groups	Push factors	Pull factors
Economic	Economic crises	Developed industries
	Insufficient jobs/ unemployment	Better career prospects
	Poor living conditions	Better living conditions
	Low wages	Better income opportunities
Demographic and socio-cultural	Poor medical care	Better medical care
	Bullying	Life experience abroad
	Inequalities of education opportunities	Better education opportunities
	Feeling of worthlessness	Social networks and friendship links
	Safety concerns	
Political	Political crises or instability	Political or religious freedom
	Military coups	Security
	Corruption, nepotism / cronyism	Meritocracy
Technological	Lack of facilities and necessary equipment to carry out research	Better research opportunities

Figure 1. *Push & Pull Factors*

Furthermore, immigration itself is a costly process for migrants. Therefore, highly skilled immigrants should have several qualifiers such as financial capital, human capital, social capital and physical capital to migrate. Immigrants, for instance, must be able to cover all expenses to change their home country such visa (if necessary), agent's fee (if necessary), transportation, health checks, contract expenses, insurance cost and other related information expenses. Moreover, learning the language in the destination country, having recognised degrees and professional certificates can be considered among these qualifications. Besides these, social networks, the norm of reciprocity

and the sense of trust they establish are some of the facilitating effects on migration (Sirkeci, Utku, & Yüceşahin, 2019).

Apart from these, according to the study of Docquier et al. (2007) which is based on a data set originating from census and register data for OECD countries, the strongest association for brain drain is the population size of the country: countries with less population have a higher proportion of brain drain. In addition, brain drain rates are higher between countries having colonial links and geographic proximity to major OECD countries, and countries with religious fractionalisation and political instability, and with low levels of human capital (Docquier *et al*., 2007). In the coming section the push and pull factors of Türkiye are addressed through evaluating current and historical conditions.

Brain Drain from Türkiye

Brain drain has been considered a significant problem in Türkiye since the last half century and the issue has been discussed in academic literature throughout these years. Tezcan (1971), Başaran (1972), Gülmez (1974), Erkal (1980) and Atılgan (1986) were some of the first examples regarding the literature on the brain drain studies in Türkiye. According to Tansel and Güngör (2003) 'brain drain' of Turkish emigrants began in the 1960s firstly with medical doctors and engineers. Following the military coup in 1960, political instability and crisis are believed to have triggered the migration of these highly skilled professionals.

Tezcan (1971) and Başaran (1972) mainly follow similar methodologies and give brief country examples and main reasons

regarding brain drain. The paper covers statistical figures on brain drain of medical doctors, engineers and academic staff with details of gender, graduation years, emigrated country and reasons. In the same years, Gülmez (1974) evaluates particularly the legislative side of the emigration of educated and skilled individuals from Türkiye. The paper focuses mainly on the problems on the implementation of *the Law on the Students to be Sent to Foreign Countries* and measures in the development plans regarding the employment of these students. A further study on brain drain from Türkiye carried out by Erkal (1980). The author put emphasis mainly the human capital side of the brain drain problem for the least developed and developing countries. According to the paper, these countries do invest in the persons, particularly in terms of education; however, developed countries benefit from this qualified manpower without any investment. Therefore, developed countries can transfer savings to research and development expenditures. Apart from these, Atılgan (1986) focuses on the emigration of academic staff in details of educational fields and academic titles. The paper examines main reasons and measures to be taken in terms of brain drain by scrutinising five-year development plans from 1963 to 1989. As a consequence of the 2001 economic crisis, young university graduates intended to pursue their careers abroad. Studying postgraduate studies abroad was considered as a first step prior to fulfil this goal (Tansel and Güngör, 2003). Current developments regarding to brain drain from Türkiye are discussed in the following paragraphs.

When considering the number of recent studies regarding to the push factors for Türkiye, some of these studies focused mostly on economic factors such as economic crises, insufficient jobs,

unemployment, poor living conditions and low wages (Aytaç and Aydın, 2019; İyi, 2020; Kaya, 2021; Yılmaz, 2019). Furthermore, recent studies regarding to push factors for Türkiye mainly mentioned about demographic and socio-cultural factors such as bullying, inequalities of education opportunities, feeling of worthlessness and safety concerns (Atmaca, 2020; Tanrısevdi et al., 2019). Apart from these, other studies underlined the significance of political push factors such as political crisis or instability, military coups, corruption, nepotism/cronyism (Dudu and Rojo, 2022; Elveren and Toksöz, 2019; Özçürümez and Yetkin Aker, 2016). Lastly, Atmaca (2020), Rüzgar (2020) and Tanrısevdi et al. (2019) also mentioned the role of technological push factors such as lack of facilities and necessary equipment to carry out researches.

When it comes to the pull factors for Türkiye, Aytaç and Aydın (2019), Tanrısevdi et al. (2019) and Yılmaz (2019) argued that economic factors such as developed industries, better carrier prospects, better living conditions and better income opportunities influences decisions of highly-skilled Turkish citizens to migrate. Moreover, Rüzgar (2020) and Tanrısevdi et al. (2019) mainly underline the significance of demographic and socio-cultural factors as pull factors for Türkiye. Apart from that, Dudu and Rojo (2022), Elveren and Toksöz (2019), Özçürümez and Yetkin Aker (2016) and Rüzgar (2020) mainly mentioned about political factors as pull factors for Türkiye such as political or religious freedom, security and meritocracy. Lastly, Rüzgar (2020) and Tanrısevdi et al. (2019) mentioned the significance of technological pull factors such as better research opportunities.

Apart from these, observing the official statistics in the following Figure 2, almost 17 per cent of GDP in Türkiye has been comprised of the public education and social protection expenditures to enhance human capital of the country since the year 2011. Since, young and possibly well-educated individuals are prone to emigrate from Türkiye, some part of GPD expenditure on human capital formation goes to the destination countries.

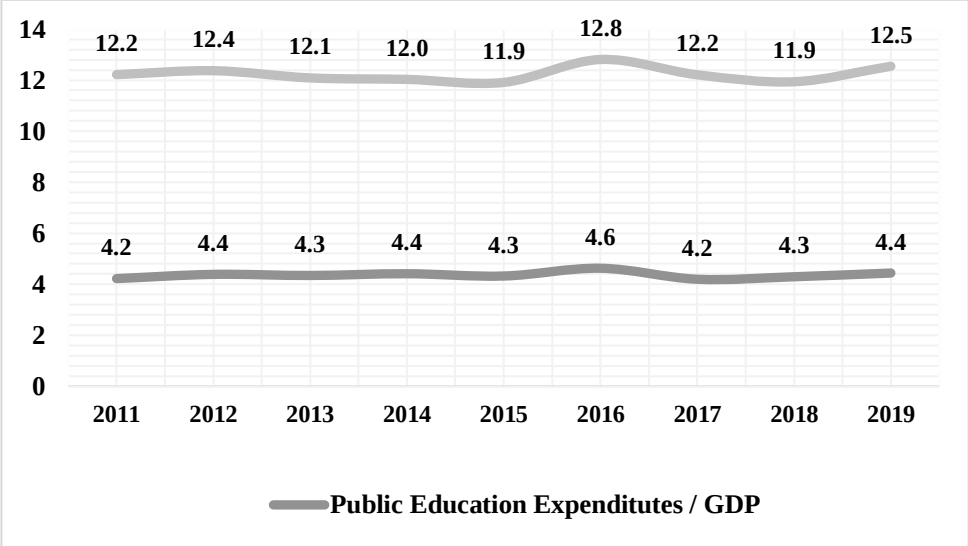

Figure 2. *Public Education and Social Protection Expenditures* (2011-2019, % of GDP)

*Source: TurkStat, Education Expenditure Statistics, 2021 and Social Protection Statistics, 2021

Considering the education expenditure statistics, expenditures per student has been highest for the last eight years in the tertiary education in Türkiye (Please see Figure 3. Education Expenditures

(2011-2019, Per Student, US Dollars). It is also noteworthy that public expenditures per capita in tertiary education have decreased each year since 2012.

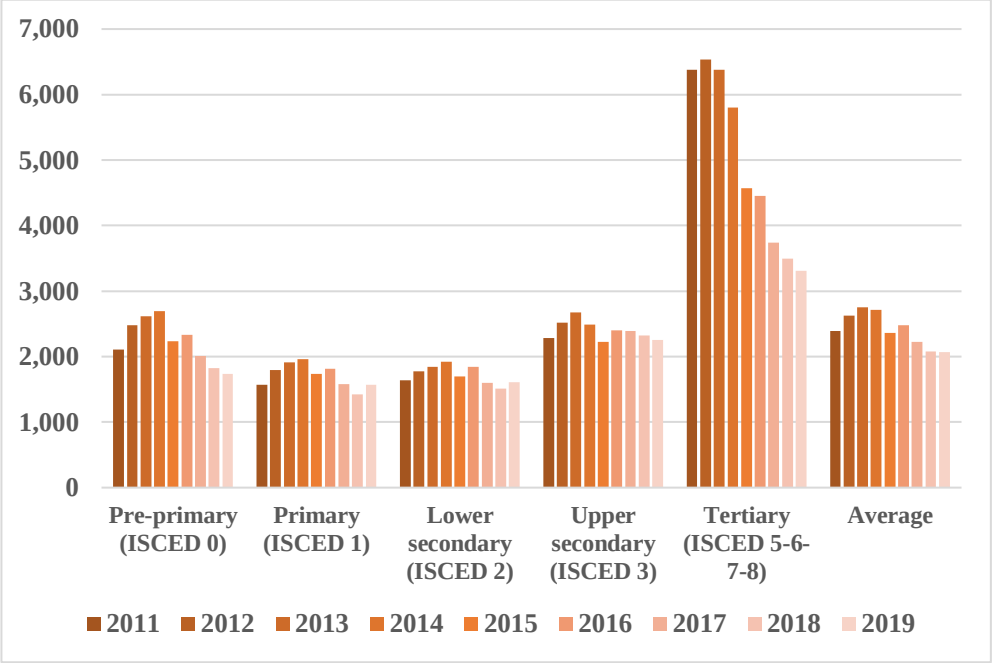

Figure 3. *Education Expenditures (2011-2019, Per Student, US Dollars)*
*Source: TurkStat, Education Expenditure Statistics (2021)

Overall, countries with emigrants from a young and possibly well-educated cohort, is indispensably in tendency to lose its human capital permanently at no cost to more developed countries unless there is a satisfying level of brain circulation established between the source and destination countries. In this regard, first of all brain drain rates from the origin country should be scientifically proven by several dimensions such as by years, by destination country, by educational

fields, by departments and by gender. In the methodology section of this paper, data collection, classification and analysing methods are applied to calculate brain drain rates of Türkiye are explained in details.

Methodology

The analysis dataset in the paper was based completely upon administrative registers of public institutions of Republic of Türkiye. These public institutions including Ministry of Interior, Directorate-General for Population and Citizenship Affairs for residence abroad data, and Council of Higher Education of Türkiye (CoHE) for higher education data. The target group for the analyses are individuals those registered in the Registration System of Turkish Citizens Abroad, a database system under Central Population Administration System (MERNIS).

Both the higher education data and residence abroad data of Turkish citizens are available as two different databases in the Turkish Statistical Institute. In order to carry out this research, firstly, necessary permissions were obtained from the Turkish Statistical Institute for the use of the microdata sets. Secondly, the two databases were integrated through matching the anonymized national personal identification numbers of Turkish citizens on individual basis. Consequently, the final integrated dataset contained the graduation departments and dates of Turkish bachelor's degree graduates, as well as the time periods in which countries they resided in.

The classification of levels of education is based on the International Standard Classification of Education (ISCED), an

instrument to compile and present education statistics. ISCED 2011 has nine hierarchical education levels, from level 0 to level 8. For instance, ISCED 0 stands for early childhood education, ISCED 1 stands for primary education, ISCED 2: lower secondary education, ISCED 3: Upper secondary education, ISCED 4: Post-secondary non-tertiary education, ISCED 5: Short-cycle tertiary education, ISCED 6: Bachelor's or equivalent level, ISCED 7: Master's or equivalent level and ISCED 8: Doctoral or equivalent level education (Eurostat, 2021).

For the year 2020, the denominator for the analyses are number of 1,730,955 bachelor's graduates (ISCED level 6) of universities under the responsibility of CoHE within the years 2004-2013, except open and distant education graduates for the calculation of brain drain rates of the year 2020. These higher education institutions cover all universities in Türkiye. The denominator for each year is calculated through taking back the interval back one year. For instance, the brain drain rate for the year 2019, is calculated through considering 52,872 bachelor's degree graduates living abroad in 2019 among 1,605,111 individuals who graduated between 2003-2012.

Turkish bachelor's degree graduates abroad who have not returned to Türkiye after seven years from their graduation are subjected to 'brain drain' in this paper. The assumption of seven years is made according to ISCED 2011 Typical (Most Common) Durations of Education Levels. As shown at Table 1, master's or equivalent level studies typically completed between 1-4 years following ISCED level 6, that is bachelor's degree. Doctoral or equivalent level studies take between 4-7 years when directly following a bachelor's degree (OECD, 2017). Thus, the assumption of seven years covers the duration of both

master's and doctoral level studies. The limit of seven years has been determined as an assumption in order to separate the individuals who have just graduated from the university and those who have returned after receiving a master's or/and doctorate education abroad. It was assumed that a significant part of those who were abroad for a short period of time could be eliminated through the assumption of seven years. Consequently, students who still reside abroad after seven years of bachelor's graduation date are accepted as non-return graduates in this research.

Table 1.

ISCED 2011 Typical (Most Common) Durations of Education Levels

ISCED 2011 Levels		**Typical (Most Common) Duration**
6	Bachelor's or equivalent level	3-4 years directly following ISCED level 3
7	Master's or equivalent level	1-4 years following ISCED level 6
8	Doctoral or equivalent level	4-7 years directly following ISCED level 6

*Source: OECD (2017)

Apart from classifications of educational levels, the classification of fields of education and training was assembled according to the International Standard Classification of Education: Fields of Education and Training 2013 (ISCED-F). ISCED-F 2013 is an international framework for organising education programmes and related qualifications by fields.

First and foremost, constraint in the database is that the Registration System of Turkish Citizens Abroad is based upon the

voluntary application of Turkish citizens living abroad (Supreme Election Council of Türkiye, 2022). The citizens are not necessarily obliged to register in the system through Turkish embassies and consulates, nevertheless they do apply to be registered in the system so as to maintain citizenship affairs, such as compulsory military service for male citizens, voting for the parliamentary and presidential elections, marriage and divorce transactions etc.

Results

Brain Drain by Years

Total number of 1,730,955 individuals have received their bachelor's degrees from Turkish universities within the years 2004-2013. As mentioned under the methodology section of this paper, number of graduates abroad who have not returned to Türkiye after seven years from their graduation are subjected to 'brain drain' in this paper. In this regard, through considering 55,918 bachelor's degree graduates abroad after seven years from their graduation brain drain rate of Türkiye is calculated as 3.23 per cent in the year 2020. When calculating the brain drain rate for each year, the interval was taken back one year. For instance, the brain drain rate for the year 2019, which is 3.29, is calculated through considering 52,872 bachelor's degree graduates living abroad among those who graduated between 2003-2012 (Please see Table 2 and Figure 4. *Brain Drain Rates for Türkiye for the years 2009-2020* below for further details).

Table 2.

Aggregated Data Set by Years

Graduation Periods	Reference Year	Number of Graduates	Number of Abroad	Brain Drain Rate (%)
1993-2002	2009	503,762	11,624	**2.31**
1994-2003	2010	597,680	13,161	**2.20**
1995-2004	2011	697,873	15,071	**2.16**
1996-2005	2012	801,230	19,464	**2.43**
1997-2006	2013	908,535	22,534	**2.48**
1998-2007	2014	1,019,448	26,552	**2.60**
1999-2008	2015	1,137,166	31,966	**2.81**
2000-2009	2016	1,263,670	34,741	**2.75**
2001-2010	2017	1,376,227	40,667	**2.95**
2002-2011	2018	1,480,340	47,629	**3.22**
2003-2012	2019	1,605,111	52,872	**3.29**
2004-2013	2020	1,730,955	55,918	**3.23**

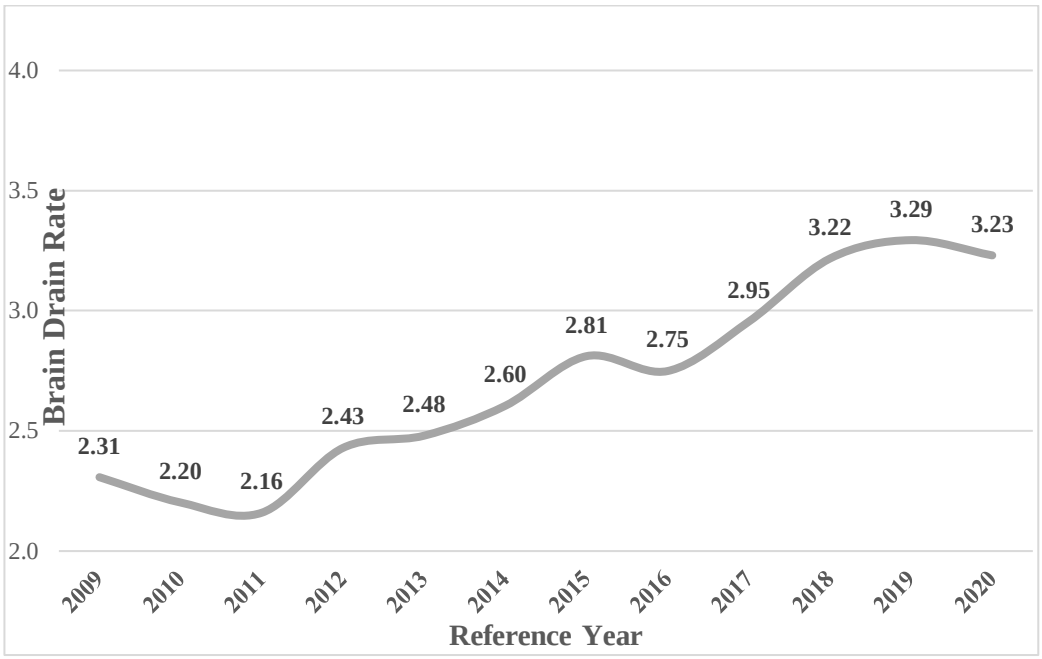

Figure 4. *Brain Drain Rates for Türkiye for the years 2009-2020*

Brain Drain by Countries

Table 1 gives an overview of brain drain rates of Turkish bachelor's graduates by country in the year 2020. It is observed that almost fifty per cent of non-return Turkish graduates prefer to reside in the United States of America (22,4%), Germany (14.3%) and the United Kingdom (11.6 %).

Table 1.

Brain Drain by Countries, Top 20 Countries by Frequency and Percentage

Country	Number of non-return graduates	Percentage of non-return graduates among all
United States of America	12,548	22.4
Germany	7,993	14.3
United Kingdom	6,494	11.6
Netherlands	3,675	6.6
Canada	2,232	4.0
United Arab Emirates	1,484	2.7
France	1,479	2.6
Australia	1,441	2.6
Switzerland	1,205	2.2
Belgium	1,119	2.0
Sweden	938	1.7
Austria	828	1.5
Russian Federation	805	1.4
Italy	744	1.3
Spain	742	1.3
Ireland	618	1.1
Poland	602	1.1
Qatar	524	0.9
Czech Republic	373	0.7
Saudi Arabia	346	0.6
All others	9,728	17.4
Total	55,918	100.0

Most of the top twenty destinations are from European countries, the USA and Canada. The United Arab Emirates (2.7%), Russia Federation (1.4%), Qatar (0.9%) and Saudi Arabia (0.6%) are the other target destinations for Turkish bachelor's degree graduates.

Lastly, 17.4 per cent of Turkish graduates prefer to reside in the other countries which are not listed in Table 1.

Aksoy (2012) argues that an individual's acquaintance or eagerness to adapt to the culture of the destination county is an accelerator factor to move to or to settle down in the country. Additionally, geographical distances, and historical, cultural, lingual or alphabetical, religious differences or similarities may influence the country preferences of new graduates.

Brain Drain by Departments

When number of non-returned graduates is examined in Table 2, it is observed that the departments where the brain drain is occurred most are that business administration, computer engineering, mechanical engineering, economics, industrial engineering, and electrical and electronic engineering respectively in the year 2020. Moreover, the number of engineering departments also are considerably high.

Table 2.

Brain Drain by Departments, Top 20 Departments by Frequency

Department	Number of non-return graduates
Business administration	3,395
Computer engineering	3,186
Mechanical engineering	2,719
Economics	2,649
Industrial engineering	2,172

Electrical and electronic engineering	2,127
Civil engineering	1,751
International relations	1,356
Mathematics	1,195
Chemistry	1,089
Law	1,000
Biology	979
Physics	969
Chemical engineering	942
English language teaching	780
Medicine	773
Architecture	759
Molecular biology and genetics	634
Turkish language and literature	631
Classroom teaching	587
All others	26,225
Total	55,918

When the percentage of non-returned graduates is examined in Table 3, the multiplicity of engineering departments draws attention as in Table 3. Apart from this, brain drain rates of molecular biology and genetics department reached enormous levels of 32.5 per cent. It means, approximately one out of every three graduates of this department goes abroad. Similarly, one out of every five to seven graduates of (a) information systems engineering, (b) business informatics and (c) mechatronics engineering and (d) software engineering also migrates.

Table 3.

Brain Drain by Departments, Top 20 Departments by Rate (n > 200)

Department	Brain Drain Rate (%)
Molecular biology and genetics	32.5
Information systems engineering	21.5
Business informatics	16.6
Mechatronics engineering	15.7
Software engineering	14.8
Bioengineering	14.5
Industrial design	13.4
Computer engineering	13.2
Computer technologies and information systems	11.6
Economics	11.2
Physics engineering	11.2
Electronics engineering	10.9
Political science	9.9
Spanish language and literature	9.5
Electrical engineering	9.4
Naval architecture and marine engineering	9.4
Political science and international relations	9.3
Electronics and communication engineering	9.2
Management information systems	9.2
Industrial engineering	9.1

Brain Drain by Educational Fields

Considering the field of study according to ISCED-F classification, 55,918 Turkish bachelor's degree graduates reside abroad and 6,897 of them have graduated from electronic and automation field. This field is followed by (a) teacher training with

subject specialisation with 4,762 graduates, (b) management and administration with 4,302 graduates, (c) mechanics and metal trades with 3,296 graduates and (d) economics with 3,277 graduates (Please see Table 4 for more details).

Table 4.

Brain Drain by Educational Fields (ISCED-F 2013), Top 20 Fields by Frequency

Educational Fields	**Number of non-return graduates**
Electronics and automation	6,897
Teacher training with subject specialisation	4,762
Management and administration	4,302
Mechanics and metal trades	3,296
Economics	3,277
Inter-disciplinary programmes and qualifications involving engineering, manufacturing and construction	2,945
Political sciences and civics	2,305
Literature and linguistics	2,047
Building and civil engineering	1,751
Biology	1,629
Mathematics	1,517
Physics	1,224
Chemistry	1,089
Audio-visual techniques and media production	1,080
Architecture and town planning	1,059
Law	1,000
Chemical engineering and processes	983
Medicine	773
Earth sciences	720
History and archaeology	660

All others	12,602
Total	55,918

Table 5.

Brain Drain by Educational Fields (ISCED-F 2013), Top 20 Fields by Rate (n > 100)

Educational Fields	**Brain Drain Rate (%)**
Engineering and engineering trades not elsewhere classified	35.4
Inter-disciplinary programmes and qualifications involving information and communication technologies	16.6
Biochemistry	16.5
Database and network design and administration	12.7
Software and applications development and analysis	11.5
Electronics and automation	11.4
Electricity and energy	9.5
Inter-disciplinary programmes and qualifications involving engineering, manufacturing and construction	8.8
Language acquisition	8.2
Chemical engineering and processes	7.5
Mechanics and metal trades	6.7
Political sciences and civics	6.7
Motor vehicles, ships and aircraft	6.5
Hotel, restaurants and catering	5.6
Audio-visual techniques and media production	5.4
Building and civil engineering	5.4
Fashion, interior and industrial design	5.2
Architecture and town planning	4.9
Psychology	4.8
Travel, tourism and leisure	4.8

Brain Drain by Countries and Departments

Considering the brain drain from Türkiye by country and department, computer engineering, business administration and mechanical engineering are generally in the top four among the most popular countries listed in Table 6. While the United States of America and the United Kingdom come to the fore with computer engineering and business administration, Germany is the most popular destination for mechanical engineering graduates from Türkiye.

Table 6.

Brain Drain by Countries and Departments, Top 20 Matches by Frequency

Country	Department	Number of non-return graduates
United States of America	Computer engineering	758
United States of America	Business administration	751
United States of America	Electrical and electronic engineering	682
United States of America	Economics	547
United States of America	Industrial engineering	542
United States of America	Mechanical engineering	520
United States of America	Mathematics	395
United States of America	Medicine	303
United States of America	Chemistry	301
United States of America	Civil engineering	290
United States of America	Physics	287
United Kingdom	Business administration	460
United Kingdom	Computer engineering	442

United Kingdom	Economics	375
United Kingdom	Mechanical engineering	301
Germany	Mechanical engineering	558
Germany	Computer engineering	469
Germany	Business administration	396
Germany	Economics	303
Netherlands	Computer engineering	417

Brain Drain by Countries and Educational Fields

Considering the brain drain from Türkiye by country and educational fields; electronics and automation fields is at the top with a high margin in all countries in Table 7. The fields of both management and administration and teacher training with subject specialisation are also among the areas where brain drain is intense in the United States, Germany and the United Kingdom.

Table 7.

Brain Drain by Countries and Educational Fields (ISCED-F 2013), Top 20 Matches by Frequency

Country	**Educational Fields**	**Number of non-return graduates**
United States of America	Electronics and automation	1,860
United States of America	Teacher training with subject specialisation	1,027
United States of America	Management and administration	937
United States of America	Inter-disciplinary programmes and qualifications involving	697

	engineering, manufacturing and construction	
United States of America	Economics	682
United States of America	Mechanics and metal trades	646
United States of America	Biology	502
United States of America	Political sciences and civics	461
United States of America	Mathematics	440
United States of America	Literature and linguistics	364
Germany	Electronics and automation	1,027
Germany	Teacher training with subject specialisation	798
Germany	Mechanics and metal trades	671
Germany	Management and administration	527
Germany	Economics	368
United Kingdom	Electronics and automation	798
United Kingdom	Management and administration	576
United Kingdom	Economics	472
United Kingdom	Teacher training with subject specialisation	450
Netherlands	Electronics and automation	770

Brain Drain by Gender

The findings of Elveren and Toksöz (2019) revealed that female Turkish citizens abroad have higher tendency to migrate or not return compared to males. However, the findings of this paper proved that while brain drain rate of male is 3.62%, it is 2.84% for females. A further study conducted by Tansel and Güngör (2003) also highlighted the gender gap among Turkish students having education in abroad. According to their questionnaire study, nearly 90 per cent of Turkish

postgraduate students were males in the year 2003. Nevertheless, the result of this register evidence paper shows that the gender gap was not that much great in the year 2020, as 43 per cent of non-return graduates consist of females. One of the reasons for diminishing the gender gap may be that the difference between men and women in the total number of higher education graduates has disappeared over the years. Furthermore, the rate of brain drain from Türkiye is calculated as 3.23% for the year 2020 according to the administrative registers of public institutions of Türkiye (Please see **Table 8.** Brain Drain Rate by *Gender* for the details).

Table 8.

Brain Drain Rate by Gender

Gender	Total number of graduates	Total number of non-return graduates	Brain Drain Rate (%)
Male	882,348	31,954	3.62
Female	843,287	23,964	2.84
Total*	1,730,955	55,918	3.23

* Total number of graduates is not equal to the sum of male and female graduates due to absence of info based on gender of 5320 persons in the administrative registers.

Discussion & Conclusion

The findings of this brain drain research is completely based on administrative registers of different governmental institutions of Türkiye. The findings of combined dataset provide the details of the

Turkish bachelor's degree graduates by destination country, departments, age, gender and the year. To our knowledge, this paper is the first study which analyses brain drain from Türkiye through administrative register evidence of non-return bachelors' degree graduates. Therefore, the results of this paper are believed to make a significant contribution to the higher education policies, labour market policies, highly skilled migration policies, reverse brain policies and aforementioned programmes in Türkiye.

The results indicate that brain drain rate of Turkish bachelor's graduates has gradually increased from 2.31 per cent to 3.29 per cent between the years 2009 and 2019 in Türkiye. It is noteworthy that the rate of brain drain, which was 2.16 in 2011, increased almost every year after this year and reached 3.29% in 2019. The rate of brain drain from Türkiye dramatically increased by more than 50% between 2011 and 2019. Meanwhile, the partial decrease in the rate of brain drain in 2020 is likely to be due to the Covid-19 pandemic.

Apart from that, the brain drain rates reach more than 10 per cent in the information and communication technologies and the electronic fields that appear as a significant issue in Türkiye due to its private and social costs to Turkish society. There are several obstacles that need to be addressed while shaping a sustainable future of work in Türkiye including (a) skills mismatching issues including over mismatching, (b) double-digit unemployment figures as high as 25% among the young population aged 15-24, (c) depreciation of up to 350% in Turkish Liras between January 2017 and January 2022, (d) decreasing tertiary level education expenditures per student from around six thousand dollars to around three thousand dollars, and (e) unsatisfying merit-

based working and promotion conditions. Additionally, a further push factor is the lack of career opportunities in several educational fields. For instance, graduates of departments regarding 'Genetics', such as 'Molecular Biology and Genetics' or 'Genetics and Bioengineering', are more inclined than most of other departments with more than 40 per cent brain drain rates due to insufficient working areas in the sector within Türkiye. In this regard, precautions could be taken such as supporting related industries to create technology driven jobs where highly skilled brain drain rates are high. For these reasons, education policies should be well harmonised with labour market policies by policymakers to increase human capital indicators of the country.

The results of this research could be used as a guide by Presidency of the Republic of Türkiye Human Resources Office, the Higher Education Council, the Ministry of National Education, the Ministry of Labour and Social Security, and other relevant institutions to develop policies that cover the needs of youth after graduation regarding to living and labour market conditions. Meanwhile, the private and social rates of return to investments in education and training should be closely monitored through regularly updating and analysing these brain drain datasets with the purpose of increasing the learning capacity of both citizens and organisations (OECD, 1996). In this context, it is essential to take steps such as increasing cooperation between universities and employers, providing private sector incentives to create employment, using qualified workforce in qualified jobs, and university quota planning, especially for the identified departments where the brain drain rate is occurred the most such as molecular biology and genetics (32.5%), information systems engineering (21.5%), business informatics (16.6%), mechatronics

engineering (15.7%), software engineering (14.8%) and bioengineering (14.5%).

Another step is to improve merit-based working and promotion conditions within the country both in public and private sectors. Additionally, opening new research centres in Türkiye to generate more satisfying environments for researchers could be a further way of limiting brain drain rates of the country (OECD, 1996). Last but not the least, the knowledge and experiences of highly skilled Turkish citizens living in the diaspora could be transferred to Türkiye through establishing networks among them. The scientific diaspora studies of Türkiye could focus on the countries where the brain drain rates from Türkiye is higher such as the United States of America (22.4%), Germany (14.3%), the United Kingdom (11.6%), the Netherlands (6.6%), Canada (4.0%) and the United Arab Emirates (2.7%). In this regard, the findings of this paper could be beneficial for several institutions of Türkiye including the Presidency for Turks Abroad and Related Communities and Republic of Türkiye Ministry of Foreign Affairs. Lastly, the results of this research can also contribute to the 'TUBITAK International Leading Researchers Support Program', which has been carried out by the Ministry of Industry and Technology in order to ensure reverse brain drain since 2018.

Lastly, the brain drain rate of male is 3.62%, it is 2.84% for females in the year 2020. The study of Tansel and Güngör (2003) regarding to brain drain from Türkiye indicated that nearly 10 per cent of Turkish bachelor's degree graduates were females. The result of this study showed that the gender gap largely disappeared in the year 2020. Moreover, a very recent study on Turkish brain drain and gender

conducted by Elveren and Toksöz (2019) also revealed that more female Turkish citizens abroad prefer to migrate compared to the males. However, the findings of this paper showed that brain drain rates of women significantly less than men for Turkish citizens. This may be because of that the immigrants generally have to work in less qualified jobs than their own skills; this situation may become even worse for female immigrants. In addition, women's longing for family, relatives and friends may be higher than men. In addition to these, the difficulties of starting a family and raising children abroad may have been more influential in women's decisions to reside abroad compared to the males.

Limitations and Future Directions

Administrative registers of non-return bachelor's graduates used in this paper are based on the statements of Turkish bachelor's degree graduates residing abroad. The calculations are limited to only Turkish bachelor's degree holders from Turkish universities. There is no information about whether the immigrants included in the calculations have received master's or doctorate level education in Türkiye or in the countries where they reside. Therefore, the data on Turkish high skilled workers who migrated abroad are at least as much as the statistics given in this study, the actual number may be higher than the figures here. The results indicated that brain drain rate of bachelor's degree graduates increased more than 50% between the years 2011 and 2020. Therefore, future research is need to investigate the reason behind the high increase rates in brain drain from Türkiye. Statistics on the sociological causes of brain drain can be obtained by conducting surveys on people who have migrated abroad. A

prospective paper on reverse brain drain could be a worthwhile further study, nevertheless longer time series should be available in order to observe the possible return migration movements of highly skilled graduates.

Ethical Text

In this article, the spelling rules, research and publication ethics, publication principles and ethical rules stated in the journal were followed. All violations arising from this article are under the responsibility of the author(s). Additionally, the comments regarding the findings obtained within the scope of this research belong only to the researchers and do not bind the Turkish Statistical Institute.

Acknowledgement

I have to express our appreciation to Mr. Turgay ALTUN for his fruitful suggestions. I also thank to English Language and Literature Writer Mrs. Naciye Kübra METIN for proofreading the article.

Data Availability Statement

Due to statistical confidentiality reasons, authors of this study do not agree for their data to be shared publicly, so supporting data is not available.

References

Aksoy, Z. (2012). Uluslararası Göç ve Kültürlerarası İletişim [International Migration and Intercultural Communicaton]. *Uluslararası Sosyal Araştırmalar Dergisi, 5*(20), 292-303.

Atılgan, D. (1986). Beyin Göçü [Brain Drain]. *Türk Kütüphaneciliği, 35*(3), 27-36.

Atmaca, T. (2020). An Examination of Academically Successful Secondary School Students' Aspirations with Regard to Potential Human Capital Flight (Brain Drain). *International Journal of Contemporary Educational Research, 7*(1), 280-299. doi:10.33200/ijcer.708765

Aytaç, S., & Aydın, G. (2019). Analysis of the Effects of Pull and Push Factors on Brain Drain: An Example of Turkey. *Journal of Social Economics Research, 6*(2), 74-84. doi:10.18488/journal.35.2019.62.74.84

Bailey, A., & Mulder, C. (2017). Highly Skilled Migration Between the Global North and South: Gender, Life Courses and Institutions. *Journal of Ethnic and Migration Studies, 43*(16), 2689-2703. doi:10.1080/1369183X.2017.1314594

Bakırtaş, T., & Kandemir, O. (2010). Gelişmekte Olan Ülkeler ve Beyin Göçü: Türkiye Örneği [Developing Countries and Brain Drain: Turkish Example]. *Kastamonu Eğitim Dergisi, 18*(3), 961-974.

Barbone, L., Kahanec, M., Kureková, L., & Zimmermann, K. (2013). *Migration from the Eastern Partnership Countries to the European Union — Options for a Better Future.* IZA Institute of Labor Economics.

Baruch, Y., Budhwar, P., & Khatri, N. (2007). Brain Drain: Inclination to Stay Abroad After Studies. *Journal of World Business, 42*(1), 99-112. doi:doi.org/10.1016/j.jwb.2006.11.004

Başaran, F. (1972). Türkiye'de Beyin Göçü Sorunu [Brain Drain Problem in Turkey]. *Araştırma*, s. 133-153.

Beine, M., Docquier, F., & Rapoport, H. (2001). Brain Drain and Economic Growth: Theory and Evidence. *Journal of Development Economics, 64*(1), 275-289. doi:doi.org/10.1016/S0304-3878(00)00133-4

Beine, M., Docquier, F., & Rapoport, H. (2008). Brain Drain and Human Capital Formation in Developing Countries: Winners and Losers. *The Economic Journal, 118*, s. 631-652. doi:doi.org/10.1111/j.1468-0297.2008.02135.x

Chaloff, J., & Lemaître, G. (2009). Managing HighlySkilled Labour Migration: A Comparative Analysis of Migration Policies and Challenges in OECD Countries. *OECD Social, Employment and Migration Working Papers*. doi:10.1787/1815199X

Constant, A. (2014). *Do migrants take the jobs of native workers?* IZA World of Labor, Institute of Labor Economics (IZA).

Docquier, F., & Rapoport, H. (2004). *Skilled Migration: The Perspective of Developing Countries.* Washington, D.C.: World Bank Policy Research Working Paper No.3382. doi:doi.org/10.1596/1813-9450-3382

Docquier, F., & Rapoport, H. (2012). Globalization, Brain Drain, and Development. *Journal of Economic Literature, 50*(3), 681-730. doi:10.1257/jel.50.3.681

Docquier, F., Lohest, O., & Marfouk, A. (2007). Brain Drain in Developing Countries. *The World Bank Economic Review, 21*(2), 193-218. doi:doi.org/10.1093/wber/lhm008

Dudu, S., & Rojo, T. (2022). The European Union as a destination of Turkish migrants in 2008–2018. *New Perspectives on Turkey, 66*, 140-159. doi:10.1017/npt.2022.4

Elveren, A., & Toksöz, G. (2019). Hidden gender dimensions of the brain drain: the case of Turkey. *New Perspectives on Turkey, 60*, 33-59. doi:10.1017/npt.2019.3

Erkal, M. E. (1980). Beyin Göçü [Brain Drain]. *Sosyoloji Konferansları Dergisi*(18), s. 73-80.

Eurostat. (2021). *Glossary: International Standard Classification of Education (ISCED)*. Retrieved from Statistics Explained: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:International_standard_classification_of_education_(ISCED)

Gibson, J., & McKenzie, D. (2011). Eight Questions about Brain Drain. *Journal of Economic Perspectives, 25*(3), 107-128. doi:doi.org/10.1257/jep.25.3.107

Gökbayrak, Ş. (2008). Uluslararası Göç ve Kalkınma Tartışmaları: Beyin Göçü Üzerine Bir İnceleme [Discussions on International Migration and Development: A Research on Brain Drain]. *Ankara Üniversitesi SBF Dergisi, 63*(3), 65-82. doi:doi.org/10.1501/SBFder_0000002073

Gülmez, M. (1974). Beyin İhracına Dönüşen Beyin Göçü [Brain Drain Turning into Brain Export]. *Amme İdaresi Dergisi, 7*(1), s. 62-79.

Güngör, N., & Tansel, A. (2007). Brain Drain from Turkey: The Case of Professionals Abroad. *Institute for the Study of Labor (IZA) Discussion Papers No. 2617*, 1-48.

Haque, N. U., & Kim, S.-J. (1995). "Human Capital Flight": Impact of Migration on Income and Growth. *IMF Staff Papers, 42*(3), s. 577-607. doi:doi.org/10.2307/3867533

İnce, C. (2020). From Brain Drain to Brain Circulation: Brain Power in Regional Development. *International Journal of Eurasia Social Sciences, 11*(42), 1092-1114.

İyi, M. M. (2020). Türkiye'nin Nitelikli İş Gücü Kaybı: Almanya'nın Yeni Göç Yasası [Skilled Labour Force Loss of Turkey: Germany's New Migration Law]. *GAV Analiz*(4), 1-13.

Kahanec, M., & Králiková, R. (2011). Pulls of International Student Mobility. *Institute for the Study of Labor (IZA) Discussion Papers No. 6233*, 1-16.

Kaya, E. (2019). Türkiye'de Gençlerin Göç Eğilimini Etkileyen Unsurlar Üzerine Bir Alan Araştırması [A Field Study on the Factors Affecting Youth Migration Tendency in Turkey]. *Sosyal, Beşeri ve İdari Bilimler Dergisi, 2*(9), 657–676. doi:doi.org/10.26677/TR1010.2019.209

Köser-Akçapar, Ş. (2006). Do Brains Really Going Down the Drain?: Highly Skilled Turkish Migrants in the USA and the "Brain Drain" Debate in Turkey. *Revue Européenne Des Migrations Internationales, 22*(3), 79-107. doi:doi.org/10.4000/remi.3281

Latukha, M., Shagalkina, M., Mitskevich, E., & Strogetskaya, E. (2021). From Brain Drain to Brain Gain: The Agenda for Talent

Management in Overcoming Talent Migration from Emerging Markets. *The International Journal of Human Resource Management, 32*, pp. 1-30. doi:doi.org/10.1080/09585192.2021.1949374

Lee, E. S. (1966). A Theory of Migration. *Demography*(3), 47-57. doi:doi.org/10.2307/2060063

Lerner, S. (1994). The future of work in north america: good jobs bad jobs beyond jobs. Futures 185–185. *Futures, 26*(2), 185.

Martiskova, M. (2013). *What Are The Main Reasons for Young Greeks to Emigrate.* Enschede: Unpublished Master Thesis, University of Twente School of Management and Governance.

OECD. (1996). *The Knowledge-Based Economy.* Paris: Organisation for Economic Co-operation and Development.

OECD. (2017). *OECD Handbook for Internationally Comparative Education Statistics: Concepts, Standards, Defiinitions and Classifications.* OECD Publishing.

OECD, European Union, UNESCO Institute for Statistics. (2015). *ISCED 2011 Operational Manual: Guidelines for Classifying National Education Programmes and Related Qualifications.* OECD Publishing.

Ozcurumez, S., & Yetkin Aker, D. (2016). What Moves the Highly Skilled and Why? Comparing Turkish Nationals in Canada and Germany. *International Migration, 54*, 61-72. doi:10.1111/imig.12234

Özden, Ç., & Schiff, M. (2006). *International migration remittances and the brain drain.* World Bank : Palgrave Macmillan.

Portnoi, L., Rust, V., & Bagley, S. (2010). *Higher Education, Policy, and the Global Competition Phenomenon.* New York: Palgrave Macmillan. doi:doi.org/10.1057/9780230106130

Rüzgar, M. (2020). Dönmek veya Dönmemek, İşte Bütün Mesele Bu [To Return or Not to Return, That is the Question]. *Journal of Qualitative Research in Education*, *8*(4), 1080-1115. doi:10.14689/issn.2148-2624.8c.4s.2m

Sağırlı, M. (2006). *Eğitim ve İnsan Kaynağı Yönünden Türk Beyin Göçü: Geri Dönen Türk Akademisyenler Üzerine Alan Araştırması [Turkish Brain Drain in Terms of Education and Human Resources: A Field Study on Returning Turkish Academics].* İstanbul: Unpublished Ph.D. Thesis, İstanbul University Institute of Social Sciences.

Sarcan, E. (2022). Yüksek Vasıflı İşgücünün Göçü: Beyin Göçü. *Ankara Üniversitesi Sosyal Bilimler Dergisi*, *13*(2), 69-75. doi:10.33537/sobild.2022.13.2.7

Sirkeci, İ., Utku, D., & Yüceşahin, M. (2019). Göç Çatışma Modelinin Katılım, Kalkınma ve Kitle Açıkları Üzerinden Bir Değerlendirmesi. *Journal of Economy Culture and Society*, *59*, 157-184. doi:10.26650/JECS2019-0016

Supreme Election Council of Türkiye. (2022). *Circular 140/II. Procedures and Principles of Updating the Overseas Voter Register.* Retrieved from https://ysk.gov.tr/doc/genelge/dosya/77563/2018CBMV-Ydisi-GuncellestirmeGenelgesi.pdf

Tanrısevdi, F., Durdu, İ., & Tanrısevdi, A. (2019). Beyin Göçü Mü, Beyin Gücü Mü? [Brain Drain or Brain Power?]. *Journal of Travel and Tourism Research, 15*, 133-158.

Tansel, A., & Güngör, N. D. (2003). "Brain Drain" from Turkey: Survey Evidence of Student Non-Return. *Career Development International, 8*(2), 52-69. doi:doi.org/10.1108/13620430310465453

Tezcan, M. (1971). Beyin Göçü ve Türkiye [Brain Drain and Turkey]. *Amme İdaresi Dergisi, 4*(3), s. 44-71.

The World Bank. (2019). *World Development Report 2019: The Changing Nature of Work.* Washington, DC: World Bank.

The World Bank. (2021). *Research and Development Expenditure.* Retrieved from https://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS?most_recent_value_desc=true

TurkStat. (2021). *Education Expenditure Statistics.* Retrieved from https://data.tuik.gov.tr/Kategori/GetKategori?p=egitim-kultur-spor-ve-turizm-105&dil=2

TurkStat. (2021). *Social Protection Statistics.* Retrieved from https://data.tuik.gov.tr/Kategori/GetKategori?p=saglik-ve-sosyal-koruma-101&dil=2

Viseth, A. (2020). Immigration and employment substitute versus complementary labor in selected african countries. International Monetary Fund. September 1, 2022 tarihinde http://elibrary.imf.org/view/IMF001/29205-9781513551937/29205-9781513551937/29205-9781513551937.xml adresinden alındı

Yılmaz, E. (2020). Uluslararası Beyin Göçü Hareketleri Bağlamında Türkiye'deki Beyin Göçünün Durumu [The Situation of Brain Drain in Turkey within the Context of International Brain Drain Movements]. *LAÜ Sosyal Bilimler Dergisi, 10*(2), 220-232.

About the author:

Dr. Furkan Metin, received an academic foundation certificate from the London School of Economics and Political Science (LSE), U.K. in 2008. He graduated from MA International Business Management at Middlesex University, the U.K. in 2010. He had his Ph.D. degree from Ankara University Human Resources Management and Career Counselling. He worked in the Information Technologies, Strategy Development, International Relations and Methodology Departments of Turkish Statistical Institute as a Turkstat specialist. He served as the Head of Digital Transformation and Projects Department in 2020-2021 and the Head of Price Statistics Department of Turkstat in 2022. He is currently serving as the Vice President of Turkstat. He has 14 articles, 4 papers and 1 book published in national and international refereed

academic journals. His research interests are project management, strategic management, human resources management, human capital, brain drain and quantitative-qualitative research methods.

E-mail: furkanmetin@gmail.com