

Do They Stay or Go? The Situation of International Graduates in Türkiye

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Abstract

International students are a significant resource for countries in supplying qualified young individuals who are essential for innovation and growth. For this reason, there has been competition between industrialised and several rapidly industrialising countries to attract and retain highly qualified international students. To our knowledge, this paper represents the first register evidence-based study to estimate the level of brain drain to Türkiye of non-return international tertiary graduates. Higher education graduation data and employment data of international tertiary graduates were integrated by using anonymised personal foreign identity numbers in the Education-Employment database of the Turkish Statistical Institute. The integrated dataset represents the entire universe of international graduates in Türkiye. According to the results, 6,484 individuals out of 79,234 international students who graduated from universities in Türkiye between 2012-2021 continued their working life in Türkiye. Thus the average brain gain rate of Türkiye was estimated as 8.2 per cent. The departments with the highest brain gain rate were medicine, nursing and midwifery. Graduates from the top-ranked universities such as Boğaziçi, Istanbul Technical and Yildiz Technical universities demonstrated higher retention rates compared to other universities.

Keywords: Brain drain, brain gain, international students, human capital, Türkiye.

JEL Classification: F22, J24, J62, O15

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Kalıyorlar mı, Gidiyorlar mı? Türkiye’deki Uluslararası Mezunların Durumu

Özet

Uluslararası öğrenciler, yenilik ve büyüme için zaruri olan nitelikli genç bireylerin temini noktasında ülkeler için önemli bir kaynaktır. Bu nedenle özellikle endüstrileşmiş ve bazı hızla endüstrileşen ülkeler arasında, yüksek nitelikli uluslararası öğrencilerin ülkeye çekilmesi ve istihdam edilmesi adına bir rekabet yaşanmaktadır. Bildiğimiz kadarıyla, bu çalışma uluslararası öğrencilerin Türkiye’ye beyin göçü oranının resmi veriler üzerinden hesaplandığı ilk araştırmadır. Türkiye İstatistik Kurumu Eğitim-İstihdam veritabanında kişi bazında anonimleştirilmiş yabancı kimlik numarası kullanılarak yükseköğretim mezuniyet verileri ve yabancı uyruk istihdam verileri entegre edilmiştir. Entegre veri seti, Türkiye'deki uluslararası mezunların tüm evrenini temsil etmektedir. Araştırma sonuçlarına göre, 2012-2021 yılları arasında Türkiye’deki üniversitelerden mezun olan 79.234 uluslararası öğrenciden, 6.484’ü çalışma hayatını Türkiye’de devam ettirmektedir. Türkiye’nin ortalama beyin kazanım oranı yüzde 8.2 olarak tahmin edilmiştir. Beyin kazanımı oranının en yüksek olduğu bölümler tıp ile hemşirelik ve ebelik bölümleri olmuştur. Boğaziçi, İstanbul Teknik ve Yıldız Teknik gibi sıralamalarda önde gelen üniversitelerden mezun olan uluslararası öğrencilerin Türkiye’de kalma oranları, diğer üniversitelere kıyasla daha yüksek çıkmıştır.

Anahtar Kelimeler: Beyin göçü, beyin kazanımı, uluslararası öğrenciler, beşeri sermaye, Türkiye.

JEL Sınıflandırması: F22, J24, J62, O15

1. Introduction

As a result of globalisation, the international higher education sector has grown steadily in the last twenty years in parallel with increasing international student mobility. In 2019, the economic size of the international education sector was estimated to have reached \$200 billion (ICEF, 2022). The number of international tertiary students worldwide quadrupled from 1.5 million to 6 million between 2000 and 2021 (OECD, 2022b; Project Atlas, 2020). During this period, there has been a notable increase in the proportion of international migration of highly skilled professionals. This trend can be attributed to the internationalisation of labour markets and the increasing demand for highly skilled individuals particularly in developed countries. There has been a competition between developed countries to attract higher education students and to retain successful graduates whose skills are needed in the country (Sugimura, 2015). The permanent migration of highly skilled professionals is referred to as *brain drain* for origin countries and *brain gain* for destination countries. Indeed, the permanent migration of these professionals is considered one significant factor in economic growth and innovation (Bailey & Mulder, 2017). Due to their higher productive capacity gained through greater education and skills training, highly skilled individuals may well facilitate changes of ideas and knowledge to a greater extent compared to low-skilled migrants (Kahanec & Králiková, 2011).

The human capital explanation assumes that increasing international student mobility is linked to the rising demand for highly skilled professionals with tertiary education. The rising global demand prompts many students particularly in developing countries to seek education and work opportunities abroad (Portnoi, Rust, & Bagley, 2010). During the last two decades, the countries preferred by international students have also diversified significantly. Ortiga (et al., 2017, as cited in King & Sondhi, 2017) argued that the directions of international student migration from North to North and South to North have been shifting gradually. For example, until the 2000s, the number of universities and countries that could attract international students from different countries was quite limited. At the beginning of the 2000s, nearly half of all international students used to choose either the United States or the UK, while today only one in four students choose these two countries. The remaining three out of four students choose new emerging countries in higher education or countries that they feel geographically and culturally close to (Metin, 2022). A study conducted by Jones and De Wit (2012) pointed out that the West, particularly the Anglo-Saxon paradigm, has started to change with new emerging countries from different geographies such as China, Russia, the United Arab Emirates, and Türkiye.

Purpose of the Study and Research Questions.

Brain drain refers to the migration of skilled individuals from their country of origin to developed countries in search of better working and living conditions (Metin & Ertan, 2022). Brain drain mainly applies to the migration of relatively highly educated

individuals from developing countries to developed ones (Beine et al., 2001). The non-return international tertiary students who obtain a work permit in a foreign country after completing their studies abroad is a form of brain drain for their country of origin (Baruch et al., 2007). Similarly, non-return international students who have been granted work permits subsequent to their academic pursuits in the destination country could be considered brain gain for the destination countries (Metin, 2022).

As an emerging country, there have been several recent studies regarding brain drain from Türkiye (Güngör & Tansel, 2007; İyi, 2020; Kaya, 2019; Köser-Akçapar, 2006; Metin & Ertan, 2022; Rüzgar, 2020; Tanrısevdi, Durdu, & Tanrısevdi, 2019; Yılmaz, 2020). Nevertheless, there appears to be a lack of research on brain drain to (brain gain of) Türkiye based on the existing literature. There have also been several recent studies about international students in Türkiye. A considerable number of these studies have focused merely on the problems that international students face with in Türkiye (Aslan & Babirzade, 2020; Başaran Alagöz & Geçkil, 2017; Demir, 2017; Erişti, Polat, & Erdem, 2018; Köleoğlu, 2018; Kumcağız, Dadashzadeh, & Alakuş, 2016; Musaoğlu, 2016; Nkoko, 2016; Özkan & Acar Güvendir, 2015; Özkan Bardakcı & Bardakcı, 2021; Sadik, 2017; Sağıroğlu, 2015; Şanlı & Poyraz, 2018; Şeker, 2016; Urhan Torun & Bozkurt, 2019; Usta, Sayın, & Güzelipek, 2017; Yardimcioglu, Beşel, & Savaşan, 2017). While several other studies have focused on international relations (Büyükgöze, 2016; Demirhan, 2017; Eren, 2017; Naz, 2015), some other studies have focused on economic issues (Baş & Eti, 2020; Birekul & Alkın, 2019; Metin, 2022; Süygün & Kaplan, 2021; Tuzcu, 2021; Ünsal, 2019). However, almost none of these studies have focused on the brain gain rate of Türkiye of international graduates. Mathies and Karhunen (2020) highlighted the lack of research on the topic of brain gain rates of international graduates. The author argued that the increase in international student mobility raises questions of how many international graduates continue their working life in their destination countries.

According to the Higher Education Council of Türkiye (2023), the number of international tertiary students in Türkiye has increased by about ten times between 2012 and 2022 to reach 260,000. As a result, Türkiye has entered the list of the top ten destination countries hosting the highest number of international students in the world (Metin, 2022). In light of these statistics, it has emerged as a significant research topic to determine the brain gain rate (retention rate) of international students in Türkiye.

To our knowledge, this paper is the first study which explores the brain gain rates of Türkiye through non-return international students who have obtained valid work permits after their graduation. The dataset represents the entire universe of international graduates in Türkiye within the period spanning from 2012 to 2021. Through considering the universe of international tertiary graduates in Türkiye, the research questions of this paper are listed as below.

- 1) What are the possible reasons behind the substantial rise in the quantity of international students in Türkiye during the last decade?
- 2) What are the brain gain rates for Türkiye by years?
- 3) What are the source countries from which Türkiye receives the most brain gain?

- 4) Which university and department graduates continue their working life in Türkiye the most?
- 5) Does the brain gain rate of Türkiye differ regarding gender?

2. The Consequences of Brain Drain for Origin and Destination Countries

From the perspective of the origin countries, brain drain is commonly viewed as harmful to the growth prospects of developing countries as the emigration results in a loss of expertise, thereby reducing human capital and the availability of skilled professionals in the country (Gibson & McKenzie, 2011). From this perspective, brain drain refers to the phenomenon where a country loses its highly educated and skilled individuals, such as researchers, scientists, and professionals, resulting in little or no benefit to the country of origin and a free influx of talented individuals to the destination country (Köser-Akçapar, 2006). Highly skilled individuals, such as researchers, practitioners, and international students choose to emigrate to more developed nations with greater opportunities (Abbas et al., 2021). Nonetheless, when international students do not return to their country of origin and contribute their own knowledge and skills, it can result in a substantial loss of human capital that negatively affects their country of origin (Docquier & Rapoport, 2004).

Meanwhile, brain drain can turn into an advantage for the country of origin in the case of brain circulation. Brain circulation was firstly conceptualised by Gaillard and Gaillard (1998). The term refers to the movement of skilled individuals between countries, allowing for the exchange of knowledge, ideas, and experiences. Brain circulation emphasizes the idea that a mobility of talent can be a mutually beneficial process for both origin and destination countries. Therefore, brain circulation leads to a two-way flow of human capital (Saxenian, 2005). This is due to the fact that individuals can gain new perspectives and opportunities abroad. Thus their social ties with peers, professionals, family and friends in the country of origin can lead to the exchange of knowledge, ideas, experiences and even the flow of foreign direct investment. Conversely, when these immigrants return to their countries of origin, they can contribute to heightened productivity within their home nation (Saxenian, 2005). Overall, the possible negative impacts of brain drain can be lessened for the country of origin through brain circulation.

From the perspective of destination countries, developed countries in particular establish policies to attract and retain highly educated individuals, i.e. "brain gain." The immigration of international students can have both positive and negative effects on the destination country's science and technology, higher education system, and labour market (Kahanec & Králiková, 2011). Furthermore, the international education sector is described as one major industry in several developed economies, due to the high commercial volume of the sector. As of 2019, the economic size of the international education sector is estimated to have reached \$200 billion (ICEF, 2022). The steady growth rate of the sector and its expanding commercial volume are considered an economic growth opportunity by countries. The United States of America (USA) as the

market leader generated \$57.3 billion, followed by the United Kingdom with \$25.5 billion, and Australia with \$19.8 billion. Germany and France jointly shared the fourth position with \$14.5 billion (Choudaha, 2019). According to the US Department of Commerce, the country hosted over a million international students in the 2019-2020 academic year and generated \$38.9 billion in revenue from educational service exports. Additionally, international education service exports also contributed to the employment of 420,000 Americans (The International Trade Administration, US, 2022). The sector is also critical for Australia, since it is the fourth-largest export category for the country. In 2022, Australia exported \$29 billion worth of education services to international students, contributing to the employment of 240,000 Australians (International Education Association of Australia, 2023). Apart from the potential financial and job-related contributions of international students, with the increase of highly skilled immigrants in the country, activities like research and development and high-value economic ventures are expected to grow. Good communication and collaboration with the country of origin can also bring benefits, as well as an increase in creativity due to the cultural diversity it fosters (Sağırlı, 2006).

On the other hand, while brain drain is a “drain” for the country of origin, it may not always be a complete “gain” for the destination country. Indeed, highly skilled immigrants have the potential to provide benefits for the destination countries through contributing to growth in the production of goods and services. Nevertheless, economic productivity in the destination country may not grow along with it (Constant, 2014). When highly skilled immigrants and native workers have complementing skills, immigration raises labour demand, consequently leading to increased wages and employment opportunities for natives. Furthermore, if highly skilled immigrant workers have substitute skills with native workers, then immigration raises labour supply which results in lowering the wages and employment level of native-born workers (Viseth, 2020). Similarly, research conducted by Demirci (2020) in the US labour market highlighted that increase in the labour supply through temporary work permits in a specific sector, reduces the job opportunities of recent native-born master’s degree holders but raises the income of experienced native-born master’s degree holders in the same sector. Apart from that, even though some immigrants have high levels of educational attainment in their country of origin, 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 the lower employment probability of immigrants, which in turn increases the need for unemployment benefits overall. Institutional barriers such as the poor or complicated recognition of degrees, insufficient knowledge of the destination country language (Barbone et al., 2013) or discriminatory hiring practices vis-a-vis immigrants (Lerner, 1994) are some of the reasons behind downskilling. Downskilling problems, therefore, can also cause *brain waste* for the destination country (Barbone et al. 2013). Staniscia et al. (2019) defined brain waste as the situation in which the skills of the immigrants are underutilised. A further problem that might arise due to the emigration of highly skilled individuals from developing countries to developed countries was argued by Borjas (2004). The author claimed that international tertiary

students limit the opportunities available to natives in graduate education, particularly at the most elite universities in the USA. Nevertheless, the impact of international students on educational opportunities in host countries is a complex and controversial issue. Several factors such as enrolment trends, visa policies, selection processes, diversity, and quality issues in higher education all need to be taken into account in order to develop a more valid evaluation.

Even though each non-return tertiary graduate may not always mean an absolute brain gain for the destination country, when exceptional circumstances are overlooked, these people are typically acknowledged as highly qualified individuals and a positive addition to human capital. Hence, within the scope of this research, non-return international graduates holding valid work permits are considered brain gain for Türkiye.

Van Der Wende (2015) argued that the retention of international students for permanent employment has been observed in not only developed countries but also in an increasing range of other countries. As discussed in the preceding sections of this paper, Türkiye has entered the list of the top ten destination countries in the world by hosting more than 260,000 international students. In this regard, before exploring the brain gain rates of Türkiye, the possible reasons behind the substantial rise in the quantity of international students in Türkiye over the last decade are discussed in the following section.

3. The Situation of Türkiye in Terms of International Students

International tertiary students are students who leave their country of origin and move to another country for short-cycle tertiary education or bachelor, master or doctoral level education (OECD, 2022a). Despite the rapid increase in international competition in the higher education sector, Türkiye, which hosted around 25,000 international students in 2011, managed to increase this number to over 260,000 by 2022 (see Figure 1 for details).

Put Figure 1 about here

As a result of this regular increase in the last ten years, Türkiye has entered the top ten countries preferred by international students worldwide (Metin, 2022). There have been several reasons behind the substantial rise in the quantity of international students in Türkiye over the last decade. From a structural point of view, the Presidency of Turkish and Related Communities Abroad (TRCA), which was established in 2010, has been very effective in the internationalisation of the Turkish education sector. TRCA has been the pioneering organization making systematic contributions in this sense. University application processes have been simplified with the “Study in Turkey” project, which was implemented by TRCA in 2012, enabling international students to gather under a single roof the university application processes in Türkiye. Another project implemented by TRCA is “Turkey Scholarships”. With this project, international student scholarships

given by various public institutions were gathered under one roof. While 40 thousand applications were made to the project in 2012, the number of applications reached 165 thousand students in 2021. Furthermore, internationalisation of the sector has accelerated due to steps taken by the Higher Education Council of Türkiye (CoHE) between 2015-2022. The significant steps taken by the CoHE include:

- Increasing the number of memorandums of understanding made with 15 countries in 2014 to 54 by 2021.
- Increasing the number of incoming students within the scope of the international student exchange program to 6,500.
- Increasing the number of joint education programs from 202 in 2017 to 269 by 2021 between universities affiliated with the CoHE and universities abroad.
- The publication of the Internationalisation of Higher Education Strategy document for the first time in 2017,
- The establishment of the International Relations Department affiliated with the CoHE for the first time in 2017 (Metin, 2022).

When the demand conditions in the Turkish higher education sector were examined one of the factors behind the ten-fold increase in the number of international students in Türkiye between 2011 and 2021 was seen to be the rising education and schooling rates of the young population. In parallel with the increase in the young population and the increase in the demand for higher education, the number of university students, which was 3 million in 2009, exceeded 5 million in 2015 and 8 million in 2022. From the supply side, the number of teaching staff in the higher education institutions of Türkiye, which was 66 thousand in 2001, reached 108 thousand in 2011 and exceeded 180 thousand as of 2022. Additionally, the number of universities, which was 76 in 2002 reached 157 in 2012 and 208 in 2022 (Higher Education Council of Türkiye, 2023). Meanwhile, it has been determined that one of every seven universities in Türkiye is in the top 1200 in one or more of THE, QS or ARWU rankings (Metin, 2022).

Apart from these factors, the policy of increasing the number of foundation (Vakif) universities has also facilitated the internationalisation of the Turkish higher education sector. In the context of legal regulations, the Regulation on Foundation Higher Education Institutions published in the Official Gazette, No. 26040 on 31 December 2005 has facilitated and regulated the establishment of foundation universities. In fact, the foundation universities in Istanbul, which host 25% of the total international students in Türkiye, have served as a locomotive for the internationalisation of the Turkish higher education sector.

Furthermore, Türkiye is geographically located at the intersection of the continents of Europe, Africa and Asia. Thus, approximately 98% of international students who come from 47 different countries, can have a direct flight to Türkiye with a maximum flight of four to five hours. The fact that there are direct flights from these countries to Türkiye also increases the attractiveness of the country to international students. Moreover, Türkiye has become an important tourism destination worldwide due to its rich historical heritage and legacies in various geographical regions and its rapidly

developing accommodation, food, transportation, culture, art and entertainment sectors (including Turkish TV and streaming series). All these factors have helped increase the attractiveness of Türkiye to international students (Metin, 2022).

In terms of legal improvements, various legislation has been introduced by Türkiye to attract and retain qualified human capital, legislation such as the International Labour Law, No. 6735 published in August 2016. The law encourages successful international students to stay in Türkiye after graduation. Under this law, all international students studying in Türkiye, as well as academic staff and researchers, are eligible to obtain temporary work permits while they are engaged in educational or research activities. Additionally, international students who graduate from engineering or architecture departments can obtain project-based and temporary work permits (Higher Education Council of Türkiye, 2017). A further step taken by the CoHE of Türkiye has been to extend the period of stay of doctoral students after graduation. In this regard, “*Protocol on the Principles of Cooperation on Residence Permit Applications for Foreign Students, Post-Doctoral Researchers and Academics in Higher Education Institutions and their Families*” was signed between the CoHE and the Ministry of Interior of Türkiye on October 27, 2016. Thus, the bureaucratic processes have been accelerated by enabling the residence permits of international doctorate students to be issued by the universities where they study (Higher Education Council of Türkiye, 2017).

Meanwhile, the commercial value of the international higher education sector is estimated to be around \$200 billion (ICEF, 2022). The total number of international students exceeded 6 million worldwide, and Türkiye has over 4%, of the share through hosting over 260,000 international students. Nevertheless, despite having over 4% of the market share in terms of number of international students, the revenue of Türkiye from education service exports is approximately \$1 billion, which is approximately 0.5% of the market share in terms of revenue (Metin, 2022). Thus, Türkiye is significantly behind in terms of revenue generated in the global market.

Overall, the tenfold increase in the number of international tertiary students pursuing their education in Türkiye during the last decade leads to the important question of in which fields these international students have received education and, after that, have obtained work permits to stay in Türkiye. The following section details the methodological process undertaken in the current study.

4. Method

The dataset was based completely upon administrative registers of public institutions of the Republic of Türkiye. These public institutions are the Labour and Social Security General Directorate for International Labour Force, and the Council of Higher Education of Türkiye (CoHE) for higher education data. Both the higher education data and international labour force 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* foreign personal identification numbers of international students on individual bases. Consequently, the final integrated anonymised dataset contained the graduation departments, dates, origin countries, and gender information of international tertiary graduates, as well as the work permits of these individuals. While the total number of international students in Türkiye reached 260,000 (Please see Figure 1), the subset of those who successfully graduated stands at 79,234. The remaining proximately 180,000 students in this cohort are either continuing their studies or have left their universities without completing their degrees. The final dataset comprises a total of 79,234 individuals, representing the entire universe of international graduates from Türkiye within the period spanning from 2012 to 2021. The final dataset, however, lacks representation of individuals under temporary protection including Syrians. The brain gain rates of Türkiye for each year were estimated through calculating the proportion of total *international tertiary graduates* who had a work permit at the reference day of 31 December 2022.

It should be noted that a portion of recent graduates may still be continuing their higher educations in different programs in Türkiye. Additionally, work permit applications of certain recent graduates may still be in progress. Moreover, it is also worth noting that some international students who completed their studies between 2012 and 2021 in Türkiye may have departed from the country, but they could return to Türkiye and acquire work permits in the upcoming years. Therefore, it may be advisable to consider potential revisions to the brain gain rates of Türkiye in the light of forthcoming statistical updates.

Put Table 1 about here

The classification of levels of education is based on the International Standard Classification of Education (ISCED), an instrument to compile and present education statistics (Please see Table 1). Within the scope of this research, all international graduates at the ISCED tertiary levels, from 5 to 8, have been encompassed in the study. 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 contains the fields of education and training and has been implemented since 2016 (EUROSTAT, 2023a).

5. Results

Brain Gain by Years

For the year 2021, the brain gain rate of Türkiye was calculated as 8.9 per cent. The aforementioned calculation was conducted through considering a total number of

15,975 international graduates in 2021 and 1,415 non-return international tertiary graduates who obtained work permits in Türkiye at the reference day of 31 December 2022 (Please see Table 2). In order to calculate the brain gain rates for each year, the interval was taken back one year. For instance, for the year 2020 the ratio was calculated through considering 1,100 international tertiary graduates with valid work permits among a total number of 12,093 international tertiary students who graduated in 2020 (Please see Table 2).

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According to

Figure 2, the brain gain rates of Türkiye have increased regularly between the years 2012 and 2021, except for 2017 and 2021. The results revealed that Türkiye's brain gain rates increased from 6.4% to 8.9% between the years 2012 and 2021. Despite the increasing trend in Türkiye's brain gain rates through non-return international graduates, it is evident that there is still a considerable way to go to becoming a popular target country for international graduates. For instance, in the US about 72% of international students initially stayed in the country after their graduation (Demirci, 2019). A recent study by Mathies and Karhunen (2020) showed a high stay rate of over 62% international tertiary graduates in Finland. The authors also shared the stay rates of international graduates in several countries including Denmark 58%, Norway 44%, and the Netherlands 38%.

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One of the reasons behind the notable decrease in brain gain rates in 2017 may be new regulations such as the “pre-permission process” that was put into force by the International Labour Law, No. 6373 in August 2016. With the new “pre-permission process”, foreigners who wanted to work in health and education service sectors were evaluated by a commission to see whether they had the competencies required by relevant professions in their work permit applications (Türk, 2019). When considering the significant amount of non-return international students who completed their studies in health or education fields (Please see Table 5), the obligation of obtaining preliminary permits may have led to some obstacles for these international students in 2017. Furthermore, the coup attempt in the 2016 may have prolonged the work permit processes of foreigners.

Brain Gain by Countries

Most of the countries where human capital flight rates to Türkiye high are from either the Middle East, Eastern Europe, Central Asia or, Southeast Asia in Table 3. Brain Gain by Countries (2012-2021) Table 3.

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Apart from these countries, there are also some countries in Africa such as Cameroon, Morocco, Ghana and Egypt. From the perspective of religion, even though Islam is the largest religion in most of the countries in Table 3, there are also several countries where Christians are the largest religious group, countries such as Moldova, Cameroon, Ukraine, Ghana and Russia. Furthermore, Table 3 also draws attention to the fact that there are many countries with high levels of economic or political instability such as Palestine, Lebanon, Yemen, and Afghanistan.

Brain Gain by Universities

Table 4 indicates that the leading universities in the Higher Education Institutions Examination (YKS) rankings have higher brain gain rates than the average brain gain rates of Türkiye which is 8.2%.

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The universities with the highest brain acquisition rate are Boğaziçi University, Istanbul Technical University and Yıldız Technical University, respectively. Furthermore, as mentioned earlier in this paper, the foundation (Vakif) universities host 25% of international students in Türkiye. Nevertheless, as it could be observed in the Table 4, the brain gain rates of international students to Türkiye are generally lower in the foundation (Vakif) universities compared to the average brain gain rate of Türkiye which is 8.2%, except for Beykent, Istanbul Commerce, Istanbul Aydın, Ihsan Doğramacı Bilkent, and Bahçeşehir.

Brain Gain by Educational Fields

Health and welfare fields such as medicine (24.5%), nursing and midwifery (15.2%) draw attention with the highest brain gain rates in Türkiye (Please see Table 5).

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Beyond this, when considering the number of total graduates, most international tertiary level students who graduated from engineering, manufacturing and construction (ISCED-F codes starting with 07) continued their working life in Türkiye. Additionally, social sciences, journalism and information (ISCED-F codes starting with 03) and Business, administration and law (ISCED-F codes starting with 04) are the other fields in which the number of international graduates with work permits are high.

Brain Gain by Educational Level

Master's or doctoral level international graduates more generally aim to settle in the destination country compared to other tertiary level international graduates (Van Der Wende, 2015). A study conducted by Guth and Gill (2008) showed that 25% of doctorate holders had not returned to their country of origins. Between the years 2005 and 2009, the United States exhibited a comparable trend, with 27% of the population with doctorate holders being comprised of foreign-born individuals (Van Der Wende, 2015). A study conducted by Demirci (2020b) revealed that 64% of Turkish international students in the US stayed in the country by transitioning to a new visa status. While this rate was 54% for bachelor's graduates, it was 67% for master's graduates, and 72% for doctorate graduates. We also observed that the retention rates of international graduates with advance degrees are more pronounced compared to those graduating from undergraduate programs in Türkiye (Please see Table 6). Nevertheless, the retention rates of international students in the US were still considerably higher when contrasted with Türkiye's retention rates.

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The results in Table 6 show that the ratio of non-return international students increases with the increase of education level. While the rate of international tertiary graduates with valid work permits was 5.2% for short-cycle tertiary level graduates, it was 7.6% for bachelor's or equivalent graduates. The non-return ratio reached 9.4% for master's (including 5-6 year faculties which is equivalent to master's) and it was 9.0% for doctoral or equivalent level graduates. In fact, non-return international graduates from 5-6 years faculties such as medicine is notable with their 20.2% ratios.

Brain Gain by Gender

Since our integrated datasets contained gender information of international tertiary level students, brain acquisition rates of international graduates were also examined in terms of gender. The results revealed that one third of international graduates consisted of females (Please see Table 7). On the other hand, males account for two-thirds of the total non-returns. In terms of proportion, females reached a higher rate than males with 8.6% to 7.9% among the international students who stayed in Türkiye by obtaining a work permit.

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6. Discussions and Conclusions

During the last two decades the directions of international student migration from North to North and South to North have shifted gradually (King & Sondhi, 2017). Particularly in the last decade, rapidly developing countries such as China, Türkiye and

the United Arab Emirates have entered the top ten countries that attract the most foreign students in the world (Metin, 2022). Between 2012 and 2022, the number of international tertiary students in Türkiye has increased by about ten times to reach 260,000 students (Higher Education Council of Türkiye, 2023). The increase in international student mobility raises questions of how many international graduates continue their working life in their destination countries (Mathies & Karhunen, 2021).

According to the results of the current research, 6,484 individuals (8.2%) out of 79,234 international students who graduated from universities in Türkiye between 2012-2021 continued their working life in Türkiye. The average brain gain (retention) rates of Türkiye was estimated at 8.2 per cent. According to the annual results, the brain gain rate in Türkiye, which was 6.4% in 2012, increased gradually and reached 8.9% in 2022 (Please see

Figure 2).

Most of the countries from which high brain gain occurred for Türkiye were either the Middle East, Eastern Europe, Central Asia or South Eastern Asia (Please see Table 3). Additionally, there were also some countries from Africa such as Cameroon, Morocco, Ghana and Egypt with high human capital flight rates to Türkiye. Apart from that, Azerbaijan, Turkmenistan and Iran were in the top three places in terms of numbers of non-return international students. When viewed proportionally, Palestine, Moldova and Cameroon were in the first three places. Furthermore, Türkiye has mainly retained tertiary level graduates from the countries where Islam is the dominant religion. Nevertheless, there were also several countries where Christians are the dominant religious group such as Moldova, Cameroon, Ukraine, Ghana and Russia. Apart from these, a significant portion of the international graduates who continued their professional working life in Türkiye come from countries with high levels of economic or political instability such as Palestine, Lebanon, Yemen, and Afghanistan.

When the results of brain gain rates by university were examined, the leading universities in rankings had higher brain gain rates than the average brain gain rates of Türkiye at 8.2%. The universities with the highest brain acquisition rates are Boğaziçi University (13.6%), Istanbul Technical University (12.2%) and Yıldız Technical University (11.7%) (Please see Table 4). Furthermore, the foundation universities in Türkiye host 25% of total international students. Nonetheless, the average brain gain rates of foundation universities were lower than the overall average of Türkiye, except for Beykent, Istanbul Commerce, Istanbul Aydın, Ihsan Doğramacı Bilkent, and Bahçeşehir universities.

Global competition to attract and retain international tertiary students in science (including medicine), technology, engineering and mathematics, (STEM) disciplines, is rising (Van Der Wende, 2015). When the results of brain gain rates by educational fields were examined, the retention rates of international tertiary students in the disciplines of science (including medicine), technology, engineering and mathematics are noteworthy

in Türkiye. Therefore, it can be contended that Türkiye has exhibited a degree of relative success in this globally competitive landscape. Particularly, health and welfare departments such as medicine (24.5%), nursing and midwifery (15.2%), and STEM fields are noteworthy with the highest brain gain rates in Türkiye (Please see Table 5).

When the results of brain gain rates by educational levels were examined, the ratio of non-return international students increases with the increase of educational level (Please see Table 6). Our results supported more recent studies of Guth and Gill (2008), Demirci (2020), and Van Der Wende (2015). The authors argued that international master's and doctoral level graduates are more likely to settle in target countries compared to other tertiary level graduates. In fact, master and doctoral graduates as highly skilled professionals are expected to have better work opportunities in target countries compared to other tertiary level graduates. In Türkiye, several legal arrangements have been conducted to retain doctoral students after their graduation such as extending in advance the period of stay for doctoral graduates by two years.

When the results of brain gain rates by educational levels were examined, the results revealed that one third of international graduates consisted of females in Türkiye. Then again, males account for two-thirds of the total non-returns. In terms of proportion, females reached a higher rate than males with 8.6% to 7.9% among the international students who stayed in Türkiye by obtaining a work permit. The higher retention rates of women may be due to the fact that Türkiye is a more developed and freer country for women compared to the countries they come from.

Since the average brain gain rate of Türkiye was estimated as 8.2 per cent, the brain circulation rate of the international students in Türkiye could be estimated as 91.8%, between 2012 and 2021. In other words, 91.8% of international graduates have returned to their country of origin or to a third country after completing their tertiary level studies in Türkiye. From the perspectives of the origin countries, returning students to their country of origin leads to a two-way flow of human capital (Saxenian, 2005). International experiences of international students is also a form of cultural, transcultural or intercultural capital (King & Sondhi, 2017). Returning international students enhance the productivity of their country of origin through the exchange of knowledge, ideas and experiences gained abroad. Moreover, social ties of returning international students with other international students, lecturers, and professionals may lead to new socio, economic and political networks between Türkiye and the origin countries.

Apart from these, it is anticipated that the findings obtained in this study may contribute to international student policies in the context of education and employment. Indeed, several steps have been taken by Türkiye to attract and retain qualified human capital. One step is the International Labour Law, No. 6735 published in August 2016. Moreover, a protocol was signed between the CoHE of Türkiye and the Ministry of Interior of Türkiye on October 27, 2016 in order to facilitate Residence Permit Applications for Foreign Students, Post-Doctoral Researchers and Academics in Higher Education Institutions and their Families. The results of brain gain rates by countries could be beneficial for international relations policies of the Ministry of Foreign Affairs

and the Presidency of Turkish and Related Communities Abroad (TRCA). Additionally, the results could also be used by the CoHE and universities to assess their contributions to highly skilled migration policies.

Lastly, most of the top national policy documents such as the 10th and 11th development plans have merely focused on increasing the number of international students in Türkiye. While the total number of international students in Türkiye reached 260,000, the count of students who successfully graduated amounted to only 79,234. The remaining 180,000 students in this cohort are either continuing their studies or have left their universities without completing their degrees. Thus, the evaluation of the higher education system in Türkiye, in terms of graduation rates of international students arises as a significant issue as well. Last but not the least, it could also be beneficial to establish strategic and quantifiable objectives within national agendas aimed at increasing brain gain rates in particular fields that are of the highest importance to the country.

Limitations and Future Directions

The estimated brain gain rates of Türkiye covers merely international students graduated from the universities under the responsibility of the Higher Education Council of Türkiye. Therefore, the number of highly skilled foreigners who have migrated to Türkiye may even be higher than the figures here. Apart from that, the brain gain rates of recently graduated international students may need to be revised in reverse in the coming years, since some of these individuals may have obtained work permits after 2022. In this case, the brain gain rates for recent years may be expected to increase to a certain extent.

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 the responsibility of the author. Additionally, the comments regarding the findings obtained within the scope of this research belong only to the researcher and do not bind the Turkish Statistical Institute.

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Table 1. ISCED Levels for Tertiary Education

ISCED 2011 Levels	Definition
5	Short-cycle tertiary education
6	Bachelor's or equivalent level
7	Master's or equivalent level
8	Doctoral or equivalent level

Source: (EUROSTAT, 2023b)

Table 2. Brain Gain Rates for Türkiye (2012-2021)

Year	Total graduates	Non-return graduates	Non-return ratio (%)
2021	15,975	1,415	8.9
2020	12,093	1,100	9.1
2019	11,665	1,044	8.9
2018	9,719	832	8.6
2017	9,048	630	7.0
2016	6,789	500	7.4
2015	5,175	370	7.1
2014	3,932	277	7.0
2013	2,779	185	6.7
2012	2,059	131	6.4
Total	79,234	6,484	8.2

Table 3. Brain Gain by Countries (2012-2021)

Country	Total Graduates	Non-return graduates*	Non-return ratio (%)
Palestine	1,250	215	17.2
Moldova	368	62	16.8
Cameroon	252	42	16.7
Lebanon	266	42	15.8
Yemen	856	135	15.8
Morocco	630	93	14.8
Ukraine	445	65	14.6
Iran	5,370	715	13.3
Afghanistan	4,086	544	13.3
Ghana	374	45	12.0
Tajikistan	488	56	11.5
Uzbekistan	536	60	11.2
Egypt	943	104	11.0
Russia	907	96	10.6
Turkmenistan	7,436	756	10.2
Pakistan	1,839	178	9.7
China	899	84	9.3
Greece	2,184	193	8.8
Albania	1,065	90	8.5
Jordan	998	84	8.4
Georgia	536	45	8.4
Kyrgyzstan	1,533	120	7.8
Azerbaijan	10,673	824	7.7
Others	35,300	1,836	5.2
Total	79,234	6,484	8.2

*n>40

Table 4. Brain Gain by Universities (2012-2021)

University	Total graduates	Non-return graduates*	Non-return ratio (%)
Boğaziçi	419	57	13.6
Istanbul Technical	1,553	189	12.2
Yildiz Technical	888	104	11.7
Kocaeli	1,008	117	11.6
Inönü	517	60	11.6
Istanbul	4,349	499	11.5
Beykent	482	53	11.0
Necmettin Erbakan	705	77	10.9
Çukurova	901	95	10.5
Akdeniz	1,135	117	10.3
Hacettepe	1,966	201	10.2
Marmara	2,475	247	10.0
Erciyes	1,294	126	9.7
Gazi	1,876	182	9.7
Istanbul Commerce	534	51	9.6
Muğla Sitki Koçman	463	44	9.5
Çanakkale Onsekiz Mart	611	58	9.5
Istanbul Aydın	1,952	185	9.5
Ankara	1,767	167	9.5
Eskişehir Osmangazi	816	77	9.4
Ege	1,547	143	9.2
Ihsan Doğramacı Bilkent	1,116	102	9.1
Dokuz Eylül	1,138	104	9.1
Sakarya	1,907	174	9.1
Karadeniz Technical	800	70	8.8
Middle East Technical	2,183	184	8.4
Bahçeşehir	1,992	166	8.3
Others	42,840	2,835	6.6
Total	79,234	6,484	8.2

* n>40

Table 5. Brain Gain by Educational Fields (2012-2021)

ISCED F Codes	Fields	Total graduates	Non- return graduates*	Non- return ratio (%)
0912	Medicine	3,849	942	24.5
0913	Nursing and midwifery	1,109	169	15.2
0321	Journalism and reporting	622	78	12.5
1041	Transport services	364	42	11.5
0715	Mechanics and metal trades	1,685	189	11.2
0416	Wholesale and retail sales	486	52	10.7
0414	Marketing and advertising	908	92	10.1
0231	Language acquisition	1,584	157	9.9
0211	Audio-visual techniques and media	1,043	98	9.4
0916	Pharmacy	616	57	9.3
0713	Electricity and energy	532	49	9.2
0714	Electronics and automation	6,345	581	9.2
0716	Motor vehicles, ships and aircraft	568	51	9.0
0412	Finance, banking and insurance	1,023	89	8.7
1013	Hotel, restaurants and catering	1,320	114	8.6
0711	Chemical engineering and processes	608	52	8.6
0413	Management and administration	9,124	774	8.5
0212	Fashion, interior and industrial design	659	55	8.3
0788	Engineering, construction, inter-disciplinary	1,629	128	7.9
0313	Psychology	576	43	7.5
0421	Law	1,029	76	7.4
0731	Architecture and town planning	2,213	163	7.4
0732	Building and civil engineering	3,677	263	7.2
0532	Earth sciences	635	43	6.8
0312	Political sciences and civics	5,234	350	6.7
0915	Therapy and rehabilitation	716	47	6.6
0311	Economics	4,905	310	6.3
0114	Teacher training with subject specialization	3,244	194	6.0
	Others	23,021	1,226	5.3
	Total	79,234	6,484	8.2

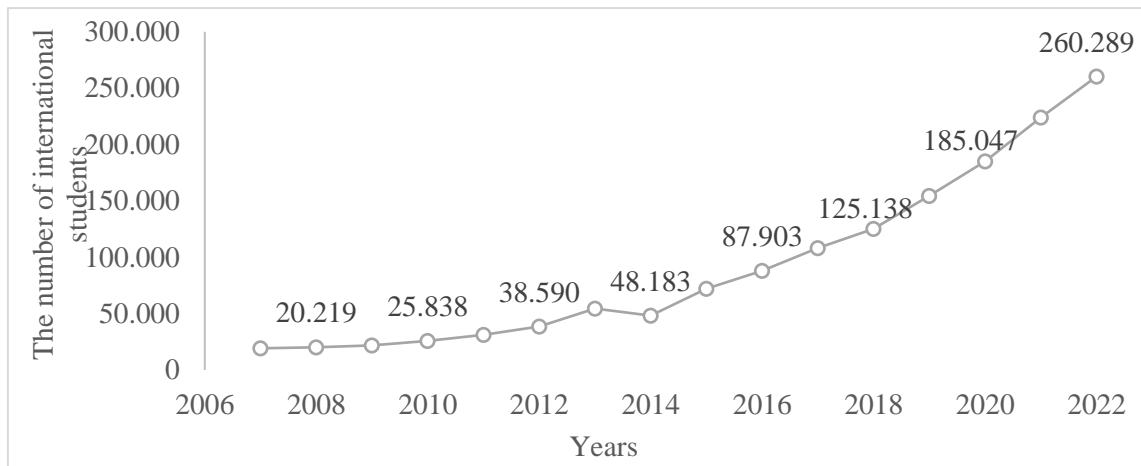
*n>40

Table 6. Brain Gain by Educational Levels (2012-2021)

ISCED 2011 Levels	Total graduates	Non-return graduates	Non-return ratio (%)
5 Short-cycle tertiary level	5,784	301	5.2
6 Bachelor's or equivalent level	40,405	3,075	7.6
7 5-6 years faculty (medicine, dentistry etc.)	5,130	1,035	20.2
7 Master's level	23,992	1,719	7.2
8 Doctoral or equivalent level	3,923	354	9.0
Total	79,234	6,484	8.2

Table 7. Brain Gain by Gender (2012-2021)

Gender	Total graduates	Non-return graduates	Non-return ratio (%)
Male	51,013	4,053	7.9
Female	28,221	2,431	8.6
Total	79,234	6,484	8.2

Figure 1 The Number of International Students in Türkiye (2007-2022)

Source: Higher Education Council of Türkiye (2023)

Figure 2 Brain Gain Rates of Türkiye (2012-2021)