Proceedings of ICEMGD 2025 Symposium: Resilient Business Strategies in Global Markets
DOI: 10.54254/2754-1169/2025.CAU25777

Influence of Brain Drain in Developing Countries

Tiankuo Li

School of Economics, Central University of Finance and Economics, Beijing, China
2023311374@email.cufe.edu.cn

Abstract. In the era of globalization, the scale of international talent mobility is enormous. However, this flow remains uneven, with developing countries often facing the challenge of brain drain. This article analyzes a number of studies on the phenomenon of brain drain and its impact on national human capital and innovation capacity in developing countries in the context of globalization. This article first summarizes the basic connotation and definition of brain drain and examines the drivers of brain drain in developing countries with the help of the two aspects of push and pull in the push-pull theory. This article analyzes how human capital and innovation capacity in developing countries have changed in the context of brain drain, summarizing research on both positive and negative impacts. Finally, this article summarizes the limitations of existing research and offers recommendations. First, cross-national comparative research and analysis of net population outflows should be strengthened. Secondly, research on non-linear relationships should be deepened.

Keywords: brain drain, developing countries, human capital, innovation capacity.

1. Introduction

The world today is in an era of economic globalization and digital information. The development of productivity has broken down traditional spatial barriers, making the international flow of various production factors possible. Among these factors, the flow of high-quality talent has brought more possibilities for scientific and technological development and cultural exchange in countries around the world. Human capital, especially those with high capabilities and high qualifications, is an important factor influencing economic development of a country, which is why it is becoming a valuable resource that countries are competing to obtain [1].

It is important to note that the flow of talent is not balanced from a global perspective. This is reflected in the fact that the direction of talent flow between developing and developed countries is not the same. Since the end of World War II, the basic flow of international human capital has been from developing countries to developed countries, from poor countries to rich countries, and from densely populated countries to sparsely populated countries. For example, many immigrants migrate from underdeveloped areas of Asia to developed areas of Europe and the Americas [2]. In the battle for talent, developed countries leverage their economic advantages to offer generous salaries and a relaxed research environment, thereby attracting talent to flow in. In contrast, developing countries with relatively underdeveloped economies inevitably face the risk of brain drain [3]. Based on previous analyses, the countries most affected by the outflow of highly educated talent, scientists

DOI: 10.54254/2754-1169/2025.CAU25777

and intellectuals are classified as moderately developed and underdeveloped countries. Therefore, the impact of brain drain on underdeveloped regions cannot be ignored.

China is a developing country with a large population and huge economic volume. Since China joined the World Trade Organization in 2001, the scale of Chinese emigration has increased, with people seeking employment overseas, studying abroad, and immigrating overseas. This has led to frequent international exchanges of human capital in China but also poses the risk of a brain drain. According to data from Chinese statistical agencies, the number of Chinese working overseas has increased by approximately 1.6 times over the past 20 years. In addition, according to other statistics, the number of Chinese emigrants has reached 8.343 million, representing an annual growth rate of 128.6% from 1990 to 2013. In addition, according to other statistics, the number of Chinese emigrants has reached 8.343 million, representing an annual growth rate of 128.6% from 1990 to 2013. Among these emigrants, high-tech talent accounts for approximately 55% [4]. For developing countries like China, brain drain changes the domestic human capital which will inevitably have an impact on economic development and technological innovation. This article suggests that a review of research on brain drain, and its impact is necessary. Based on previous literature, this article will explore the causes of brain drain and how it impacts developing countries and provide references for developing countries to address brain drain issues.

2. Different definitions of brain drain

Scholars have differing views on the definition of brain drain. The core controversy between different viewpoints focuses on the definition of talent and the reasons for its outflow. Early studies defined talent as a highly skilled group with professional capabilities in different fields, focusing on the economic value of talent for technological innovation. For example, Bhagwati first introduced the concept of brain drain in 1974, focusing mainly on the direction of talent outflow and defining it as the one-way transnational migration of highly skilled labour [5]. Subsequently, scholars further clarified the scope of talent, expanding the definition beyond highly skilled labour. Their research defines talent as human capital formed through education, capable of significantly improving productivity with their innovative ideas and the technologies they develop [6]. Michele Beine and others subsequently proposed defining brain drain using the threshold theory, arguing that if more than 5% of the population in a developing country has received higher education and the emigration rate exceeds 20%, this constitutes a systemic brain drain [7].

In the context of China in recent years, brain drain is also referred to as intellectual drain or intellectual loss in academic circles. Brain drain mainly refers to Chinese students who choose to stay overseas rather than return to China after receiving education or working abroad [8]. Brain drain mainly refers to Chinese students who choose to stay overseas rather than return to China after receiving education or working abroad [8]. Based on a clear definition of brain drain, new methods for characterising brain drain have also emerged. Li Ping and Yang Lina measured the level of brain drain using the number of immigrants during a certain period or the rate of immigration to Organization for Economic Co-operation and Development (OECD) countries (This migration rate is calculated by dividing the population flowing to OECD member countries by the total population of the country.) [9]. Xu Jiayun defines brain drain as the threshold of return on investment in education (such as the marginal balance between the cost of studying abroad and the expected return) [1]. In addition, some scholars have broken through the traditional paradigm of defining talent as a physical entity and using the intellectual influence of talent to measure brain drain. Zhan Guohui measures the Educational Incentive Effect (EIE) of international brain drain by cross-referencing it with the number of students enrolled in universities in various countries and measures

DOI: 10.54254/2754-1169/2025.CAU25777

the remittance effect (RE) of brain drain by cross-referencing it with remittance amounts [4]. Some scholars use patent applications as a criterion for judging talent, and measures talent mobility by the mobility of patent applicants' nationalities and the differences between their nationalities and places of residence [10]. In summary, scholars often use the proportion of university students studying abroad to describe brain drain and often use the proportion of brain drain to a country's total high-skilled human capital to describe the dynamic characteristics of brain drain.

3. Study on the drivers of brain drain in developing countries

In early research on talent flow, D.J.Bogue proposed the push-pull theory in the 1950s. He suggested that brain drain was influenced by two aspects, with unfavourable factors in the brain drain countries forming the push and favourable factors in the brain inflow countries forming the pull. In 1966, E.S.Lee further refined the push-pull theory, proposing that migration decisions are influenced by four types of variables: push factors, pull factors, intermediate obstacles, and personal factors. He emphasised that both the place of origin and the destination have push and pull factors. This article will analyze the driving forces behind brain drain from the perspectives of push and pull factors.

From the perspective of push factors, there is an imbalance between the development environment and talent demand in developing countries, including key dimensions such as living conditions, economic structure, scientific research conditions, career opportunities, and institutional guarantees. Furthermore, when there are close socio-economic ties with developed countries, there will be a significant driving force for brain drain. A study based on data from Nigeria over the past 20 years found that there is a positive correlation between population growth rates and migration rates in developing countries, and a negative relationship between life expectancy and migration rates, confirming that population pressure can cause significant brain to drain [11]. It is also argued that the degree of openness of a country influences brain drain, with small countries with a high degree of openness generally having higher average immigration rates than large countries [7]. Further analysis indicates that when an individual's level of education is significantly higher than the national average, their tendency to migrate is more pronounced. Economically underdeveloped regions often exhibit greater disparities in educational attainment, exacerbating this trend. In addition, corruption, poverty and inequality exacerbate economic inequality and are also key drivers of brain drain [12,13].

From the perspective of pull factors, developed countries exert a significant pull-on talent from developing countries due to their superior higher education systems, advanced scientific research infrastructure (such as MIT, Stanford University, NASA, NIH, and other top institutions in the United States), and flexible immigration policies. Research shows that geographical proximity further reinforces this effect, with developing countries located close to large countries being more prone to brain drain. For example, small economies neighbouring OECD countries tend to face more pronounced brain drain problems [14]. A study using data from student interviews found that if highly educated talent is treated better in other countries than in their own, and is given more public attention, then brain drain is more likely to occur [13]. Moreover, transnational social networks (such as family members who have already emigrated) also constitute an important pull factor. Barbara Šlibar’s research on brain drain among Croatian university students shows that family migration chains significantly increase the probability of talent outflow, as people in the country tend to migrate to countries where their relatives live [13].

DOI: 10.54254/2754-1169/2025.CAU25777

4. Impact of the brain drain

4.1. Influence on human capital

Brain drain from developing countries affects, first and foremost, domestic human capital accumulation. Early views suggest that brain drain carries harmful effects on the human capital stock in developing countries. Highly skilled immigrants consume a large number of social resources before leaving their home countries, and they do not invest their marginal output in their home countries, which is detrimental to the human capital remaining in their home countries. Although international talent flow is two-way, high-quality talent tends to migrate unidirectionally across national borders due to factors such as salary, scientific research platforms, and social welfare in developed countries. The human capital accumulated by developing countries through huge investments in education ends up flowing to other countries, and this is therefore detrimental to the human capital of the country. There is also the view that brain drain will have a negative impact through taxation. The state imposes high tax rates on highly skilled human capital, and the outflow of this human capital reduces the state's tax revenue, thereby affecting national investment in education and ultimately impacting economic growth [15].

However, as research into this topic has progressed, some have argued that brain drain can have positive effects. This positive impact promotes the accumulation of human capital in countries experiencing talent outflows through a variety of transmission mechanisms. Brain drain directly cause the loss of human capital, but the outflow effect can also have a positive impact through channels such as remittances and educational incentives. Some studies based on data from certain developing countries have found that the remittances sent by brain drainers to their home countries have a positive effect, mitigating the negative impact of brain drain [13,16]. There are also studies based on OECD countries that show that an increase in talent outflow from less developed countries can stimulate the desire to emigrate. People with the desire to emigrate will first accelerate the accumulation of human capital and personal wealth in order to achieve their emigration goals, and these efforts can promote national economic growth [14]. Li Ping also argues that brain drain significantly promotes economic growth by incentivizing human capital accumulation [9].

In addition, many studies have argued that brain drain has more than just negative impacts; positive influences are present at the same time. These studies share the view that the benefits of brain drain are possible in some cases and explore the non-linear relationship between brain drain and human capital. In the 1990s, the theory of beneficial brain drain (Beneficial Brian Drain, BBD) was first proposed. In recent years, Xu Jiayun has proposed that a U-shaped relationship is found between talent outflow and human capital accumulation in middle- and low-income countries, arguing that moderate outflow can stimulate education investment to increase human capital stock, thereby promoting economic growth [1]. Chen Xi Xi's empirical evidence supports this view, finding that lagged outflows have a positive influence on TFP, but long-term talent outflows inhibit innovation [17]. These studies examine the positive effects of the brain drain and explore the non-linear relationship between brain drain and human capital.

4.2. Influence on innovation capacity

Innovative capacity usually refers to the ability of a country or region to develop new products, services, technologies or solutions. It involves multiple factors such as knowledge creation, technology development, entrepreneurship, education and talent development. Talent is the source of a country's innovative capacity, and the outflow of talent will inevitably affect that capacity. It is

DOI: 10.54254/2754-1169/2025.CAU25777

generally believed that brain drain leads to an outflow of human capital, especially in high-tech and high-skill fields, and that countries that lose innovative talent may find it difficult to maintain long-term technological progress. However, since the BBD theory was proposed, more and more scholars believe that brain drain has a positive impact on a country's innovation capacity. Research has found that in countries with high human capital and migration rates, brain drain leads to lost technological innovation and human capital. However, in countries with human capital limitation and low migration rates, brain drain may promote investment in education and growth in human capital, thereby promoting innovation. A high-skilled talent outflow accelerates the exchange and integration of global knowledge systems, significantly promoting innovation and economic development in the home country.

In the research on China, some scholars conducted an empirical analysis of Chinese overseas migration data from 1990 to 2015 and proposed that although the brain drain is indeed partly responsible for the loss of human capital in China, over time, through channels such as educational incentives, return effects, and network effects, the brain drain will have positive effects on innovation capabilities [15]. Based on the C-D production function model, some scholars proposed that the effect of brain drain on technological innovation exhibits a U-shaped relationship under different levels of economic development and R&D investment, while human capital levels and technological gaps exhibit an inverted U-shaped relationship with this effect [4]. Xu Jiayun used panel data to analyze the results of the brain drain on human capital in 60 countries. He argues that brain drain affects high-income and low-income countries differently [1]. These studies have explored the nonlinear relationship between brain drain and innovation capacity, revealing that brain drain should be kept within appropriate limits.

5. Conclusion

In summary, in the context of globalization, the problem of brain drain is becoming increasingly prominent, with a particularly significant impact on developing countries. This article explores the drivers of brain drain and its impact on human capital and national innovation capacity. Current research reveals that although brain drain has certain negative impacts on human capital and technological innovation in developing countries, moderate brain drain can contribute to the development of the national human capital stock, thereby promoting economic and innovation capacity. Although existing research has revealed multiple influences of brain drain on the economy, innovation, and human capital accumulation, there are still some limitations to existing research. First, many studies focus on analyzing talent mobility trends but fail to fully consider the difference between population outflow and net population outflow, thereby failing to fully reveal the net loss or net gain of talent or population. Secondly, many studies focus on analyzing the brain drain mechanism in a single country or region, but there are few cross-national and cross-cultural studies. Due to differences in brain drain and its impact across regions, there is an urgent need for more international comparative studies. Future studies should place greater emphasis on the analysis and calculation of net population outflows and increase the analysis of talent flows across countries. In addition, research on individual decision-making factors for immigration can be strengthened, focusing on how micro-level variables affect brain drain. At the same time, future studies can further expand and deepen the non-linear relationship between brain drain and its impact and explore how to maximise the positive effects of brain drain through policy incentives and social environment optimisation. Future studies should comprehensively consider multi-level and multi-dimensional factors to formulate more effective policies for developing countries to respond to brain drain.

DOI: 10.54254/2754-1169/2025.CAU25777

References

[1] Xu, J.Y., Li, P., Wang, Y.J. (2016) Transnational Brain Drain and Human Capital Accumulation in China: A Perspective Based on Studying Abroad. Population and Economy (3), 91-102.
[2] Li, B.Y. (2009) International Mobility of Human Capital and the Brain Drain Crisis in China. Research on Financial Issues (5), 106-111.
[3] Peng, Y.Z. (2022) A Multi-dimensional Study of the Transnational Mobility of Chinese Scholars Based on Academic Performance. East China Normal University.
[4] Zhan, G.H., Li, Z.K. (2018) An Exploration of the Impact of Intellectual Capital Outflow on Technological Innovation. Science and Technology Management 39(6), 96-102.
[5] Bhagwati, J., Hamada, K. (1974) The Brain Drain, International Integration of Markets for Professionals and Unemployment. Journal of Development Economics 1(1), 19-42.
[6] Giannoccolo, P. (2009) The brain drain: A survey of the literature. Università degli Studi di Milano-Bicocca, Department of Statistics, Working Paper.
[7] Beine, M., Docquier, F., Rapoport, H. (2008) Brain drain and human capital formation in developing countries: winners and losers. The Economic Journal 118(528), 631-652.
[8] Marini, G., Yang, L. (2021) Globally bred Chinese talents returning home: An analysis of a reverse brain-drain flagship policy. Science and Public Policy 48(4), 541-552.
[9] Li, P., Yang, L.N. (2013) The Impact of Human Capital Outflow and Remittances on Technological Innovation. Modern Finance (Journal of Tianjin University of Finance and Economics) 33(2), 18-27.
[10] Meng, X.X., Yu, C.L. (2024) Human Capital Outflow, the Internet, and Technological Innovation in Developing Countries. Systems Engineering Theory and Practice 44(3), 773-799.
[11] Popogbe, O., Adeosun, O.T. (2022) Empirical analysis of the push factors of human capital flight in Nigeria. Journal of Humanities and Applied Social Sciences 4(1), 3-20.
[12] Usman, M.A.M., Ozdeser, H., Çavuşoğlu, B. (2022) On the sustainable economic growth in Sub-Saharan Africa: do remittances, human capital flight, and brain drain matter? Sustainability 14(4), 2117.
[13] Šlibar, B., Oreški, D., Klačmer Čalopa, M. (2023) Push and Pull Factors in Brain Drain Among University Students. Management: Journal of Contemporary Management Issues 28(1), 65-80.
[14] Ogbeifun, L., Shobande, O.A. (2022) A reevaluation of human capital accumulation and economic growth in OECD. Journal of Public Affairs 22(4), e2602.
[15] Wu, J.J., Wang, X.Y. (2016) The Impact of Brain Drain on Technological Innovation in the Home Country: An Empirical Analysis Based on Chinese Immigrant Data. Urban Studies Journal 37(4), 1-6.
[16] Adewumi, S.B., Ogbodo, C.J., Onoh, J.E. (2019) Human Capital Flight, Remittances and the Problem of Achieving Sustainable Economic Growth in Africa. International Journal of Research and Innovation in Social Science 3(3), 190-197.
[17] Chen, X.X. (2021) The Impact of Human Capital Outflow on Total Factor Productivity in China. Shandong University.