



Brain drain: what is the role of institutions?

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Abstract

Brain drain is closely associated with human capital deficiencies and obstacles in economic development. In spite of its crucial economic implications, nations, especially the developing ones, have failed to prevent brain drain due to the focus on simple restrictive policies and the ignorance of institutional factors like weakly-enforced law and order, unfulfilled basic human rights, and others in preventing the outflow high skilled labor. Thus, this paper aims to investigate the impact of institutional quality on brain drain in 100 countries from 2007 to 2019, using system Generalized Method of Moments estimator to estimate the model involving data collected from the International Country Risk Guide, The Quality of Government Institute, and the World Bank. The empirical results indicated that quality of institutions is essential in preventing the outflow of highly skilled workers. It has become imperative for policy-makers in these countries to uphold and strengthen their nations' institutional frameworks in order to retain and attract the valuable talents to stay on and reside in their own countries.

Keywords Institutions · Brain drain · Human Capital · Economic Development · Generalized method of moments Estimator

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1 Introduction

Social scientists have long recognized the inevitable links between education and economic performance. A more educated society would normally possess higher labor productivity, longer life expectancy and has faster adoption of new technologies (Becker, 1964; Schultz, 1964; Dreze & Sen, 1999). In spite of the vast social and private benefits offered by education, enrolment and literacy, human capital accumulation is still relatively low in certain countries like the least developed countries (LDCs) and the developing countries. Taking the case of Chad as an example; the nation is still struggling with literacy rates of 48 per cent (Chaudhary & Rubin, 2011). To take into consideration these educational differences, researchers account for the role of government policies (Galor & Moav, 2006; Rajan, 2009) and historical vitality of religion (Botticini & Eckstein, 2007; Becker & Woessmann, 2008; Chaudhary & Rubin, 2011). However, a somewhat closely related factor of human capital - international skilled migration (brain drain), has received relatively less attention.

In an era where human capital is inevitable for economic growth, factors preventing indigenous talents from migrating are as crucial as promoting economic growth. This is because migration influences the human capital accumulation process (Ariu et al., 2016). According to Dustmann et al. (2011), some individuals who migrate will return to their home countries to apply their skills acquired in the host country, and those who return would normally possess a higher endowment of the skills that are highly valued in the home country, leading to a higher human capital accumulation in the home country. In the long run, this skilled migration is beneficial to the migrant-sending countries (Dutta & Roy, 2011; Docquier et al., 2007; Harvey, 2008; Varma & Kapur, 2013) and the migrant-receiving countries (Baudasse et al., 2018), due to the dominance of “brain effect” over “drain effects” (Beine et al., 2001).

Skilled migration, also known as brain drain, is defined by the World Bank as a situation that involves a segment of a population that is 25 years old and above, holding a tertiary-level degree, and do not apparently reside in the country where they were born. It also refers to the emigration of a country’s most highly skilled workers (Gibson & McKenzie, 2011). This phenomenon had been a norm in LDCs, as well as in developing countries, and where the developed world tends to be the destination (Peng, 2009; Tessema, 2010; Gibson & McKenzie, 2011) – South-North skilled migration. While the recent world’s brain drain level has been decreasing gradually (see: Figure I in Appendix, which illustrates that the value of human flight and brain drain index has dropped from 6.8 to 2005 to 5.5 in 2015; note that other figures are also located in the Appendix), the performance between the group of developing countries and the developed world has been asymmetric.

Figure II depicts the trend of brain drain for developed countries and developing countries during the 2006–2015 period. While the former group has been experiencing an increasing fragility in the human capital flight, the latter experienced a decreasing trend. This observation reflects that brain drain is no longer a developing countries’ phenomenon alone, but also a common feature in the developed world. As such, regardless of the countries’ status, it is interesting to identify what exactly leads talented people to pursue a home-away-from-home overseas. In his pioneering work on brain drain, Rao (1979) listed four factors that have motivated people to relocate

from developing economies to the developed world; namely wages, transportation support, stable political conditions, as well as upward mobility opportunities.

While the macroeconomic factors of brain drain had been studied extensively in the past, a somewhat important determinant of brain drain – institutional quality has been underemphasized, particularly in the LDCs and the developing countries context (Rodrik, 2000), despite the fact that it is one of the key drivers of long-run economic growth (Bhattacharyya, 2009). According to Law et al. (2013), for example, “better finance, more growth” is a more accurate proposition than “more finance, more growth”. Institutions refer to the humanly devised restrictions that create political, economic and social interaction (North, 1991). They contain the law and order, government stability, bureaucracy quality democratic accountability and others alike (based on the ICRG’s methodology).

By comparing between Figure II and Figure III, ones can infer that asymmetry of brain drain condition among different continents as well as in different groups (by development status) of countries, to some extent, is determined by the varying progress in boosting institutional quality. The mournful failure of Russia in price reforms and privatization, the dissatisfied market-oriented reforms in Latin America, and the Asian Financial Crisis which had evidently allowed financial liberalization prior to financial regulation is a recipe of disaster; all of which point to the importance of institutional quality in the agenda of reformers.

1.1 Institutions and brain drain: the issues

As noted by Sager (2020), existing global institutions are framed on the basis of power asymmetries that lead to migration policies, alongside other policies, influencing developing economies, and systematically harming poor and vulnerable people. While developing nations need skilled labors for productivity gain, in Japan, Korea, and some other developed nations in the European Union (EU), suggest that many developed countries also have been too reliant on skilled workers from abroad both to innovate and to sustain their economic growth, due to the issues of aging and decreasing population. Based on a report jointly released by the International Labor Organization (ILO), Organization for Economic Cooperation and Development (OECD), and the World Bank (2016), the proportion of skilled migrants in OECD has been persistently rising. This is because the majority of the skilled migration initiatives are developed with the aim to attract the skilled workforce from the developing countries and the LDCs (Boucher & Cerna, 2014). On the other hand, developing countries are deemed to have failed in effectively retaining their talents, in attracting skilled expatriate from overseas and in spurring investment to compensate for the outflows (Beine et al., 2011; Dias & Tebaldi, 2012). This has led to the cost not only limited to billions of dollars but also a huge deficit of skilled labor in the workforce (Tessema, 2010).

Global migration is composed of varying descriptions including general economic and social implications, as well as context-specific policy responses. Each migrant has a distinct story. For instance, patients in a community fear that the last doctor in the area will soon emigrate; the education minister in a developing country worries about the ministry’s huge spending to subsidize developed nations (host countries)

as their own pool of university graduates emigrate. Regardless of the nature of the issues, the only certainty is that global migration, particularly skilled migration (brain drain) is taking place. However, in spite of its severe economic consequences, why do nations fail to prevent or control the outflow of highly-skilled labors? Existing problems indicate that policy makers, especially those in the developing countries, fail to fight labor markets or the pull/push forces behind migration (World Bank, 2019). These forces are just too strong to be overcome with simple restrictive policies. In some developing countries, the departure of skilled workers is due to the unfulfilled basic human rights in society. Besides, healthcare labor is forced to stay under autocratic regimes and finally become jobless or resort to working in other sectors, leading to “brain waste”. The pull/push forces behind the brain drain issue are therefore, needed to be adequately managed with innovative and sound policies implemented in an institutionally sound environment. For example, a scientist, a capitalist, or a highly educated entrepreneur residing in a country with strong enforcement of intellectual property rights, not will even think of emigrating due to the assurance of protection on their innovations or novel products.

1.2 Institutions and brain drain: motivation of study

Accordingly, this study aims to investigate the effects of institutional quality on brain drain. The study is also motivated by a few observations/problems: (1) Opposing trend between institutional quality and brain drain during the recent years; (2) High costs incurred during the training provided to the eventually-leaving talents leads to a loss of outflow talents, both of which may eventually hinder sustainable development in all countries (Dutta & Roy, 2011); and (3) Limited empirical evidence to support or to argue on brain drain theories both in the developing and developed world context (Tessema, 2010). In addition, the existing literature for institutional quality-brain drain nexus mainly focuses on the LDCs and developing countries but not on the developed world (Dutta & Roy, 2011).

The phenomenon of migration has been studied from a variety of perspectives ranging from the cause (Gibson & McKenzie, 2011; Sager, 2014; Poprawe, 2015), the effects (Docquier & Marfouk, 2006; Cattaneo, 2009; and Datta, 2009), to the prospects (Tessema, 2010) of migration. This study builds on an increasing segment of the literature on the determinants of international migration by focusing on the determinants of skilled migration flows; rather than on general migration flows. Notably, when emigrating overseas, skill-specific migration tends to be more effective than the total migration in inducing migrants from the same educational group due to common interest and accord (Ariu et al., 2016).

Furthermore, while the literature focuses on the role of wage/income (McKenzie & Rapoport, 2010; Grogger & Hanson, 2011), networks of migrants (Bessey, 2012; Beine et al., 2014), and migration policies (Dutta & Roy, 2011; Sager, 2014), this study focuses on the role played by institutions. It is worth emphasizing that the focus of this study is relatively specific and is attentive of a specific factor of migrant-sending countries, namely institutions, in influencing skilled workers’ migration decisions. In studies related to economic growth, the institutional quality has been considered by some well-known economists as a main reason for cross-nations inequality (Rodrik,

2000, 2005; Law et al., 2013; Ibrahim & Law, 2016). Thus, it is at utmost importance to investigate whether the role of institutions on growth is partially channeled via the mobility of highly-skilled labors, or not.

1.3 Research question and objective

Taken together, the background, problem statement and motivation of the study spark the questions of: (1) Is institutional quality a factor of brain drain?; & (2) Can institutional quality retain and attract talents? As a result, the objective of this study is to examine the role played by institutions in brain drain, as in 100 countries around the world, for the 2007–2019 period.

1.4 Significance of study

A majority of the previous studies regarding migration had overlooked migration and development in a political (institutions) perspective and therefore were unable to include institutional causal factors into their analysis. Take the neo-classical models of migration as an example, in which it captures an insight that wage differentials serve as a crucial factor in potential migrants' decision making. To the list on the literature: differential wage between source and destination countries; demographics in source countries; housing market conditions; working environments (see: Beine et al., 2014; Sager, 2014; Grogger & Hanson, 2011; & Tessema, 2010), the study adds another essential determinant of skilled migration, namely institutions in the source nation. Inspired by the research of Tessema (2010) (LDCs) as well as Nejad and Young (2016) (both OECD and non-OECD nations), this study contributes to the literature by examining the role played by institutions in brain drain from a world point of view; rather than limited to the LDCs and developing countries as in the normative literature. This could, in turn, help to counteract some of the myths (macroeconomic factors or microeconomic factors?) and attenuate some of the common concerns about brain drain. The analysis of institutions-brain drain nexus in the world context is significant in providing practical implications as well as policy suggestions to policy makers in all groups of countries. In turn, they could successfully encourage potential skilled emigrants to remain in the home countries, and could encourage those who had already left, to return to their home countries. Both initiatives will help to ensure a large human capital stock in the home countries for a sustainable development. On the other hand, in addressing the multidimensionality of institutions, this study provides a more nuanced analysis of the institutional determinants of brain drain, with a total score of 12 political risk indicators. It is crucial to study the reasons for certain patterns of skilled migration in order to determine policies required to shape skilled migration patterns, and in turn, to limit brain drain (Poprawe, 2015).

Other uniqueness of the study includes: (1) looking at absolute level of skilled migration as dependent variable rather than bilateral or net migration flows (Ariu et al., 2016) which would render the failure to capture the effects of skilled emigration, in particular; and (2) explaining brain drain as a more comprehensive phenomenon that involves cultural, social, as well as political factors (previous studies prioritized only economic and demographic factors), through institutions. If the departure of

skilled workers is merely due to the unfulfilled basic human rights in the society, then their personal responsibility and their local government's right to coercively discourage their emigration are pointless. For instance, if healthcare labor is forced to stay under autocratic regimes with poor infrastructure, they would finally become jobless or begin working in other sectors, contributing to "brain waste". As a result, the justice of limiting migration could only tell us about the legitimate suspension of considerations of justice under extreme situations (example: natural disaster, war, and others), but not about what justice normally requires. It would be more practical, however, to pursue an analysis of brain drain from institutions point of view. That is because it is not emigration itself that is morally catastrophic; instead the faulty government policies that trigger the departure of people (Sager, 2014). Taken together, the priority on the notion that brain drain is associated with institutional quality in all groups (based on income status) of countries, would differentiate this study from the literature regarding the determinants of skilled migration.

1.5 Structure of study

The remainder of the paper is organized as follows: the next section describes the theoretical and empirical literature review, followed by illustration of theoretical framework and methodology. Section 4 showcases the discussion on results, prior to the conclusion of the study in Sect. 5.

2 Literature review on institutions – brain drain nexus

The economic literature had witnessed a rapid emergence of research on institutions (see: North, 1991; Rodrik, 2000; Demetriades & Law, 2006). They appear to reach common grounds that institutions, with a sizable number of measurements, do matter for economic performance (Tomasi et al., 2023; Cumming et al., 2023; Nguyen et al., 2023). Marra and Colantonio (2022), for example, documented the positive institutions – economic performance nexus, through the increase in renewable energy production. While brain drain or skilled migration is a multifaceted and a complex issue involving economic, political, as well as social factors (Tessema, 2010), research on the political and institutional aspects of migration had not been receiving much attention.

Migration can be described based on a simple model of international migration (Bertocchi & Strozzi, 2008) where it summarizes that the benefits from emigration is positive if the salary gap between migrant-receiving and migrant-sending countries is positive; and individuals base their emigration decisions not only on the economic performance, but also on the quality of institutions. If border controls, trade agreements, social and cultural networks, as well as domestic policies could lead to an unjust resource and burden allocation, these institutions will causally result in systematic disadvantage (Sager, 2014). If there are reasonable remedies that could minimize the impact of these harms, the moral obligations of people play a key role in upholding them. Therefore, institutional reforms, both at the national and global levels, are expected to be vital in reducing migration. Similarly, brain drain could be

analyzed from three perspectives (Bailey & Mulder, 2017): (1) social positions and identities like race, class, and gender; (2) lives, life-course events, family and partnerships; and (3) institutions and policies. Changes in a nation's institutional quality, particularly the political situation and the economic governance which regulate the markets, and hence the policy change, provide the grounds for which potential skilled migrants make emigration decisions (Cerna, 2014). Taken together, skilled migration can be theoretically explained by combining the economic perspectives (Bertocchi & Strozzi, 2008), institutional-quality aspects (Sager, 2014; Bailey & Mulder, 2017) as well as social elements (Bailey & Mulder, 2017).

Thus, it is completely reasonable to think that enhancement in the quality of institutions is an inevitable factor (pull factor for receiving countries, push factor for sending countries) of international migration. As such, there were scholars realizing the importance of institutions as an empirical causal factor for human capital accumulation (Chaudhary & Rubin, 2011; Ngoma & Ismail, 2013), educational attainment of immigrants (Bang & Mitra, 2011), and skilled migration (Zweig, 1997; Ariu et al., 2016; Nejad & Young, 2016). In the early 1990s, for example, the low credibility of governments (in letting returnees to leave once again) and political instability were among the key factors preventing talents in the U.S. to return to the home country of China (Zweig, 1997). In the early 2000s, however, the upper-middle-income country achieved a significant return migration due to political stability and better business opportunities (Zweig, 2006), among other economic and technological factors. This indirectly implies that the lack of good governance and political instability in the source countries are also the root cause of brain drain in developing countries (Tessema, 2010). The low quality of institutions as a push factor of brain drain are supported by Ariu et al. (2016), Dreher et al. (2011) and Dimant et al. (2013).

Political institutions could be further categorized into institutional quality (government credibility and transparency) and institutional stability (political stability), with both of which have differing impacts on educational attainment of immigrants in the U.S. (see Jong-A-Pin, 2009 as well as Bang & Mitra, 2011). While institutional quality (credibility and transparency) is found to raise brain drain level, institutional stability (security of civil society) is found to decrease it. Similar findings were found by Agbola and Acupan (2010) and Beine et al. (2008) for the case of Philippines. The contradicting effects between institutional quality and institutional stability could be due to the differences in the way they influence the incentives to induce migration (Bang & Mitra, 2011). Specifically, political stability raises the expected domestic returns to human capital investment. With such investments being made, individuals have less incentives to migrate from the politically stable nation to the one experiencing political turmoil. However, a source nation's high institutional quality provides highly-skilled labor with a higher incentive to migrate, compared to those who are low-skilled.

The recent literature regarding political-institutions determinants of migration, however, focuses on corruption (Poprawe, 2015; Steinberg, 2017). As an example, in a study based on a Gravity Model of migration, Poprawe (2015) examines the relationship between corruption and migration for 230 countries. A higher extent of corruption is shown to drive emigration, as it is associated with bad and unpredictable economic conditions, extensive insecurity, and a lower standard of living. Other

scholars who found corruption to influence emigration include Dimant et al. (2013) and Cooray and Schneider (2016). According to Dimant et al. (2013), corruption and political instability are among the push factors for skilled migration.

Institutions could be measured not only in a political point of view (democracy, check and balance) but also from the economic (economic freedom) perspective; and the effects of both aspects on skilled migration are found to be contradictory (Nejad & Young, 2016). While Dutta and Roy (2011) who adopt democracy as well as checks and balances (obtained from The Polity IV) to proxy political institutions, found a negative impact of the institutions on brain drain; Bang and Mitra's (2011) documented an insignificant effect of democracy. On one hand, democratic governments tend to be relatively less repressive and more responsive to the citizens' concerns, leading to lower incentives for grievances that serve as a main motive for skilled emigration (Docquier & Rapoport, 2003). On the other hand, if the occurrence of democracy is taken to correlate with higher institutional quality, there is a positive relationship between democracy and skilled migration. The sign of democracy, is therefore, theoretically ambiguous. Indeed, the only consensus which deemed to be thriving about the impact of democracy on economic development is that it is not the character of the regime as a democracy, rather, the quality of the public institutions and policies related to it that have an impact. For instance, two democratic economies may differ substantially in economic performance if one embraces trade and FDI, while another does not (Bang & Mitra, 2011), suggesting that the degree of democratization may itself rely heavily on other factors like ethnic diversity (Akdede, 2010), trade openness (Bang & Mitra, 2011), and other socio-economic factors. Thus, determining whether factor of institutions is significantly rooted in migration decisions, appears to rely heavily on the specifications of the institutional elements.

In addition, quality of institutions is not only important in the developing, migrant-sending countries, but it is also critical for the developed ones. According to Tessema (2010), government stability, socioeconomic conditions, investment profiles, democratic accountability in developed countries (Dutta & Roy, 2011), mainly are developed countries, have significant influences on skilled emigration, implying that good governance and political stability serve as the keys to reduce brain drain, regardless of the nature and type of countries. Other than looking at institutions from the perspective of home countries – push factor of brain drain, there have also been studies (Ashby, 2010; and Nejad & Young, 2016) looking at the aspect of host countries' institutions – a pull factor for skilled migration from source countries. Their findings reveal that other than the political institutions, economic institutions especially the improvement in legal system and property rights in destination countries are a significant pull factor for potential migrants in 77 source countries. Accordingly, the research of Ariu et al. (2016) and Baudasse et al. (2018) looked at institutions in both the source countries and in the receiving countries in determining net migration flows of skilled labor. The authors found that college graduates, despite the potentially higher migration costs; tend to emigrate from the nations with a low quality of governance. These groups of potential skilled labor are more than willing to migrate to nations with high quality of institutions, and sustaining that quality of institutions is inevitable in describing why people depart from their home nations as well as their preference for the potential, specific host countries.

Throughout the review, a few aspects of the studies on skilled migration were identified to have been underemphasized in the literature. The literature's focus on migration level (Ariu et al., 2016) instead of skilled migration level, would render it a failure to capture the effects of human talent outflows to other countries. When emigrating overseas, skill specific migration tends to be more effective than total migration in inducing migrants from the same educational group, due to common interest and accord. Furthermore, highly skilled migrants are not merely economic agents; they are also political, cultural, and social agents from different races, genders, classes, as well as of other social and political status. As such, analyses on the determinants of brain drain should not be merely based on economic aspects as in the literature in general; but should also be based on aspects of institutions as well as socio-politics. Methodologically, the existing literature in general, seems to be affected by the issues related to endogeneity and hence the failure to capture the dynamic nature of the panel data. Other shortcomings of the literature that render the study a uniqueness, include specificity, endogeneity and static consideration of data. A majority of the studies focused on specific countries or group of countries, rendering their findings to be narrowly practical – only practical in certain countries or groups of countries. The issue of specificity in the literature is not only restricted by the countries under study but is also limited by the choice of institutional indicators. This issue of specificity seems to result in contradicting findings among the literature.

Inspired by these observations, this study fills in the literature gap by empirically examining (with robustness checking) the impact of institutions (in both aggregate basis and individual basis) on brain drain, in the world context, using the system Generalized Method of Moments (GMM) estimator. Its novelties are two-fold: (1) able to switch from the narrow scope of analyzing economic determinants (Bertocchi & Strozzi, 2008) of brain drain to a more socio-political perspective to brain drain mitigation; and (2) could overcome the issue which arises due to endogeneity (country-specific effect) and hence is able to capture the dynamic nature of the variables. The results, findings, policy implications and recommendations of such study could be widely accepted and practised in both the international policy area, as well as in the aspects of methodology because the analysis involved both the developing countries and the countries from the developed world. Brain drain needs to be understood from these perspectives, as the existing focus (in the literature) misses and mistakes indicators of deeper socio-political problems as well as endogeneity.

3 Methodology

3.1 Theoretical framework and model specifications

Building on the Tiebout (1956) – Tullock (1971) hypothesis (migration decision is based on a set of preferences and institutions), Bertocchi and Strozzi (2008)'s international migration model (individuals base their decision to emigrate on quality of institutions as well as economic factors in the source countries) as well as Poprawe (2015)'s gravity model, this study provides a simple theoretical back up for the empirical claim: brain drain depends on institutions and some other controlled variables:

$$BD = INST + GE + GEE + Pop + RGDP \quad (1)$$

where *BD* represents brain drain; *INST* refers to institutions; and the other controlled variables including *GE*(government expenditure), *GEE*(government expenditure on education), *POP* (population), and *RGDP* (GDP per capita). The model predicts that skilled emigration flow is a function of the source countries' institutions, government expenditure, government expenditure on education, population size, as well as GDP per capita. In particular, institutions carry a negative expected priori sign. It is mainly about the clean (corruption free) and harmony socio-economic environment that institutions can provide to the residents. Majority emigration from developing economies to the developed ones are not only for the sake and seek of better educational, economic or intellectual opportunities, but are also essentially due to fragility of rule of law, credibility issue of government, red-tape, political instability back in the home country (Dutta & Roy, 2011). To sum up, the stronger and more resilient is an institutional structure in a country, the more likely would be the retention of talents.

The empirical model of this study is similar to that of Bertocchi and Strozzi (2008) in the sense that it prioritizes institutional factors to skilled migration, followed by economic factors. However, it is different as on one hand, its economic and social factors involved in the model are not restricted to wages/income (Bertocchi & Strozzi, 2008), but also include population, government expenditure, and government expenditure on education; on the other hand, the dependent variable of interest is the skilled emigration, but not the total migration in general (Bertocchi & Strozzi, 2008). In particular, the empirical model of this study include the human flight and brain drain index as the dependent variable; the total score of 12 political risk indicators in the ICRG as the main independent variable (Dutta & Roy, 2011; Bang & Mitra, 2011); and a number of control variables namely population (Beine et al., 2014; Ariu et al., 2016), real GDP per capita (Poprawe, 2015; Steinberg, 2017), government expenditure (Poprawe, 2015; Steinberg, 2017), and government expenditure on education (Sager, 2014).

According to Stolz and Baten (2012), a certain amount of income is necessary for individuals to emigrate. Therefore, the incorporation of real GDP per capita into the empirical model of this study is consistent with Bertocchi and Strozzi (2008) where the latter hypothesized that migration decision is based on wages and institutions. Other than that, while government expenditure can control for the socioeconomic development level of the home nations (Cooray & Schneider, 2016; Poprawe, 2015) by which low level of government spending (and hence low development level) likely would be the push factor; government expenditure on education or the bonding (between governments and potential emigrants) could control for the emigration (Sager, 2014). Additionally, while the former type of expenditure capture the effects on nations' economic development as a whole; the latter takes into account the effects specifically on education which is worthy to be emphasized in skilled migration analysis. Last but not least, densely populated areas tend to attract skilled labors to retain and agglomerate in source countries (Clemens, 2009; Beine et al., 2014).

Thus, the study's basic econometric model for institutions-brain drain linkage is as the following:

$$\ln BDit = \alpha_0 + \alpha_1 \ln INSTit + \alpha_2 \ln GEEit + \alpha_3 \ln GEit + \alpha_4 \ln RGDPit + \alpha_5 \ln POPit + \varepsilon it \quad (2)$$

$$(i = 1 \dots n; t = 1 \dots T)$$

Following Ibrahim and Law (2016) as well as Bang and Mitra (2011), the study incorporates the lagged dependent variable ($BDit-1$) into the specification due to the dynamic nature of the data. Accordingly, the basic econometric model becomes:

$$\ln BDit = \alpha_0 + \alpha_1 \ln BDit - 1 + \alpha_2 \ln INSTit + \alpha_3 \ln GEEit + \alpha_4 \ln GEit + \alpha_5 \ln RGDPit + \alpha_6 \ln POPit + u_i + \varepsilon it \quad (3)$$

$$(i = 1 \dots n; t = 1 \dots T)$$

where α_0 is the parameter containing constant and country specific effect that are invariant over time; BD represents the extent of skilled emigration (outflows of skilled workers), proxied by human flight and brain drain index; $INST$ captures the institutional quality, measured by the total score of 12 political risk indicators obtained from ICRG; GE and GEE capture total government expenditure (proxied by government expenditure, % of GDP) as well as government expenditure on education (proxied by government expenditure on education, % of GDP) respectively; POP is a measure of population, proxied by population size; and $RGDP$ reflects real GDP per capita, measured by GDP per capita, constant 2010, USD; u_i captures country specific effect; εit is the idiosyncratic error. The subscripts i and t refer to home countries and year respectively. The period under study is 2007–2019, and the summary of data is shown in Table 1.

Given that the gradual changes in the level of skilled migration may account for temporal dependence of the decision to migrate made in the previous period as well as the changes took place in the previous period, α_1 is expected to carry a positive sign. α_2 is the institutions' elasticity of brain drain, whose expected priori sign is negative. According to Dutta and Roy (2011), most skilled migration does not happen for better educational, economic or intellectual property, but are mainly due to prolong political, religious or ethnic unrest in their existing nations. The more politically stable environment that a nation can provide, the higher would be the chance that it can retain its talents. Otherwise, it would decrease the expected returns to investment in education, and therefore, a person who has invested educationally will tend to emigrate. Besides, the institutional quality should be directly related to the stringency of migration's rules and regulation as well as policy.

3.2 Data description

The dependent variable of interest in this study is the estimation on skilled migration from nations across the world over time. The data set provides information on brain drain (skilled migration) proxied by human flight and brain drain index across 100 countries in the world for the period 2007–2019. Note that a higher value of the index indicates higher fragility or greater displacement of talents. In this case, talents or skilled labors refer to workers with post-secondary level of education (Dutta &

Table 1 Summary data of Institutions and Brain Drain

| Variable | Proxy | Source |
|--|--|--|
| Dependent variable: Brain Drain (BD) | Human Flight & Brain Drain Index (higher value means higher fragility or greater displacement of talents) | Standard Dataset, The Quality of Government Institute |
| Independent variables | | |
| Institutions (INST) | Total score of 12 political risk indicators <ul style="list-style-type: none"> • Government Stability • Socioeconomic Condition • Investment Profile • Internal Conflict • External Conflict • Corruption • Military in Politics • Religious Tensions • Law and Order • Ethnic Tensions • Democratic Accountability • Bureaucracy Quality | International Country Risk Guide (ICRG), The PRS Group |
| Real GDP per capita (RGDP) | GDP per capita (Constant 2010, USD) | World Development Indicator (WDI), World Bank |
| Government Expenditure (GE) | Government expenditure (% of GDP) | World Development Indicator (WDI), World Bank |
| Government expenditure on education (GEE) | Total government expenditure on education (% of GDP) | World Development Indicator (WDI), World Bank |
| Population (POP) | Population, total | World Development Indicator (WDI), World Bank |

Roy, 2011). The human flight and brain drain index is a more appropriate proxy to measure brain drain as compared to the study of Poprawe (2015) which adopt international migrant stocks. Other than the parameters (as shown in Table 1) measuring institutions, the model's control variables include government expenditure, government expenditure on education (Chaudhary & Rubin, 2011), population (Ortega & Peri, 2013; Poprawe, 2015), and GDP per capita (Bang & Mitra, 2011; Dutta & Roy, 2011; Poprawe, 2015) into the analysis. Data for all the variables are obtained from stipulated sources, as shown in Table 1.

3.3 The six institutions/political risk indicators for robustness checking

The main explanatory variable in the study is institutional quality (institutions) which is proxied by the total score of 12 political risk indicators (law and order, bureaucracy quality, government stability, corruption, socioeconomic conditions, investment pro-

file, democratic accountability, ethnic tensions, religious tensions, internal conflict, external conflict, military in politics) obtained from ICRG, the PRS Group. The ICRG's political risk rating is adequate to be employed in order to provide a means in comparing and assessing institutional quality across nations (Dutta & Roy, 2011). Additionally, among the institutional indicators, it is perhaps the most frequently adopted data/proxy in empirical studies (Ibrahim & Law, 2016).

Other than the analysis based on aggregated institutions, this paper, in line with Bang and Mitra (2011) as well as Nejad and Young (2016), also involves the investigation on the institutional components' effect on poverty individually. This is to obtain a clear picture of the feasibility or extent to which individual institutional elements differs in influencing poverty, brain drain, as well as private investment. Particularly, the study checks the sensitivity of the main result (involves the total score of 12 political risk indicators) relative to the individual estimations based on the following 6 individual dimensions of institutions: government stability, socio-economic conditions, investment profiles, corruption, bureaucracy quality, as well as law and order. The selection of these 6 institutional elements is in line with the research of Dutta and Roy (2011) as well as Bang and Mitra (2011).

The use of these 6 institutional elements are also similar (in nature) to the one used by Ariu et al. (2016) (originated from Kaufmann et al., 1999), despite the fact that they are obtained from different data sources. According to Kaufmann et al. (1999), for instance, government stability (ICRG), political stability, and government effectiveness measure the ability of the government to stay in office and to carry out its declared programs; both corruption (ICRG) and control of corruption capture the degree to which public power is exercised for self-interest; both law and order (ICRG) as well as rule of law capture to what extent agents are confident in and abide by the rules of society.

Firstly, government stability (12 points) is an evaluation of both the ability of government to execute its declared program, and its ability to stay in office. The risk rating assigned is the sum of three sub-components (government unity, legislative strength, and popular support), each with a maximum score of four points and a minimum score of zero point. A score of four points indicates very low risk and a core of zero point equates to very high risk. According to Bang and Mitra (2011), government stability relates more to institutional quality, compared to political stability.

Secondly, socio-economic condition (12 points) is an assessment of the socio-economic pressures at work in society which may limit government action or trigger social dissatisfaction. The risk rating assigned is the sum of three sub-components (unemployment, consumer confidence, and poverty), each with a maximum score of four points and a minimum score of zero point. A score of four points indicates very low risk and a core of zero point equates to very high risk.

Thirdly, investment profile (12 points) is an evaluation of factors influencing the risk to investment which are not covered by other political, economic, and financial risk components. The risk rating assigned is the sum of three sub-components (contract viability/expropriation, profit repatriation, and payment delays), each with a maximum score of four points and a minimum score of zero point. A score of four points indicates very low risk and a core of zero point equates to very high risk.

Fourthly, corruption (6 points) is an assessment of corruption within the political system. The higher the score means the better the control of corruption. Such corruption is a threat to foreign investment based on the grounds that it distorts the economic and financial environment; it decreases the efficiency of government and business by enabling individual to assume positions of power via patronage instead of ability; it leads to an inherent instability into the political process. The most common form of corruption faced directly by business is financial corruption in the context of demand for special payments and bribes connected with import and export licenses, exchange controls, tax assessments, police protection, or loans. Such corruption may reduce the effectiveness of business conduct, and to some extent, could force the withdrawal or postponement of an investment project. Although the ICRG's measure takes such corruption into consideration, its priority is the actual or potential corruption in terms of excessive patronage, nepotism, job reservation, "favor-for-favors", secret party funding, and suspiciously arm-length relationship between politics and business. In the ICRG's view, these insidious kinds of corruption are posing much higher risk to multinational business as they could trigger popular discontent, unrealistic and inefficient controls on the state economy, and encourage the development of black market. The highest risk in such corruption is that at one point of time, it will become so self-important, or some major scandal will be instantly revealed, as to provoke a popular backlash, leading to an overthrow of the government, a major restructuring of the nation's political institutions, or, even worse, a major breakdown in law and order, resulting in the nation ungovernable.

Fifthly, law and order (6 points) form a single component. However, its two elements are evaluated individually, with each element being scored from zero point to three points. To evaluate the element of "law", the strength and impartiality of the legal system are taken into account; whereas the element of "order" is an evaluation of popular observance of the law. Hence, a nation could enjoy a high rating (3) in judicial system, but a low rating (1) if it suffers from an extensively high crime rate if the law is constantly ignored without effective enforcement (example: widespread illegal strikes).

Lastly, bureaucracy quality (4 points) is a shock's cushion (absorber) which tends to minimize revisions of policy in the event of regime change. Thus, high points are given to nations in which bureaucracy has the strength and expertise to govern without dramatic changes in policy or interruptions in public services. In these low-risk economies, the bureaucracy tends to be somehow independent from political pressure and to have an established mechanism for recruitment and training. In contrast, nations that lack the cushioning effect of a strong bureaucracy are entitled for low points as a regime change tends to be traumatic in the aspect of policy formulation and routine administrative functions.

3.4 Estimation technique - system GMM estimator

Arellano and Bover (1995) as well as Blundell and Bond (1998) proposed an econometric technique that estimates the regression in differences jointly with the regression in levels, namely System GMM estimator. It combines the moment conditions for the differenced model with those for the level model. Besides, the system GMM

estimator outperforms (less bias more precision) other estimators like Pool OLS, Random Effects, and Fixed Effects estimators particularly when the series are persistent - the autoregressive process is too persistent or the variables are near to a random walk (first differences may be weakly correlated with its lagged levels).

The advantage of system GMM to the difference GMM is the introduction of additional moment conditions by Blundell and Bond (1998) where the lagged differences of the dependent variables are orthogonal to the levels of the disturbances or error terms. To obtain these additional moment conditions, it is assumed that the panel-level effect is unrelated to the first observed first-difference of the regressand.

In order to confirm the validity of the moment conditions, Sargan Test is being conducted in which the additional moment conditions for the second part of the system (the regression in levels) are as follows:

$$E[(Y_{i,t-s} - Y_{i,t-s-1})(\lambda_i + \epsilon_{i,t})] = 0 \text{ for } s = 1 \quad (4)$$

$$E[(X_{i,t-s} - X_{i,t-s-1})(\lambda_i + \epsilon_{i,t})] = 0 \text{ for } s = 1 \quad (5)$$

Equations (4) and (5) are the moment conditions being employed to generate consistent and efficient parameter estimates based on the GMM procedure.

Finally, to test for consistency of the system GMM estimator, two specification or diagnostic tests were conducted namely (1) The Hansen test of over-identifying restrictions in which failure to reject the null hypothesis would suggest the validity of the instruments, and hence the adequate specification of the model; and (2) The serial correlation test of the disturbances (Arellano & Bond, 1991). Based on the theory, ones tend to reject the null hypothesis of the absence of the first order serial correlation (AR1), and tend not to reject the absence of the second order serial correlation (AR2).

In short, due to the dynamic nature of the panel data (presence of lagged dependent variables); the potential simultaneity bias; and the potential persistence of the time series, the Blundell and Bond (1998)'s system GMM estimator (two-step) is applied as the main estimation technique in this study to investigate the impact of institutions on poverty.

4 Empirical results & discussion

The following section reports the results on institutions and brain drain including the descriptive analysis, correlation, the main dynamic estimation panel results, and the individual (institutional components) dynamic estimation panel results.

Firstly, Table 2 shows the descriptive statistics on institutions (and other control variables namely government expenditure on education; government expenditure; real GDP per capita; and population) and brain drain for 100 countries during the 2007–2019 period. The statistics suggest that population has the highest average value, followed by real GDP per capita, institutions, brain drain, and government expenditure on education. Note that government expenditure has the lowest average value. On average, with the world scores 4.15 in quality of institutions; government's

Table 2 Descriptive Statistics – Institutions and Brain Drain

| Variable | Mean | Std. Dev. | Min | Max |
|----------|---------|-----------|---------|---------|
| lnBD | 1.6213 | 0.4905 | -0.1054 | 2.3026 |
| lnINST | 4.1457 | 0.6431 | 0.6931 | 10.0923 |
| lnGEE | 0.4776 | 0.4465 | -0.3508 | 3.7918 |
| lnGE | 1.4089 | 1.1517 | -6.4663 | 0.8908 |
| lnRGDP | 8.2525 | 1.5277 | 4.7518 | 11.8793 |
| lnPOP | 15.2669 | 2.2265 | 8.9211 | 21.0390 |

Note: BD refers to brain drain; INST represents institutions; GEE is government expenditure on education; GE depicts total government expenditure; RGDP stands for real GDP per capita; POP represents population

Table 3 Correlation - Institutions and Brain Drain

| Variable | IBD | INST | lnGEE | lnGE | lnRGDP | lnPOP |
|----------|---------|---------|--------|--------|--------|--------|
| lnBD | 1.0000 | | | | | |
| lnINST | -0.2466 | 1.0000 | | | | |
| lnGEE | -0.1249 | 0.0283 | 1.0000 | | | |
| lnGE | -0.6677 | 0.0877 | 0.2082 | 1.0000 | | |
| lnRGDP | -0.7669 | 0.1267 | 0.1161 | 0.8005 | 1.0000 | |
| lnPOP | -0.1654 | -0.0346 | -0.326 | -0.128 | -0.104 | 1.0000 |

Note: BD refers to brain drain; INST represents institutions; GEE is government expenditure on education; GE depicts total government expenditure; RGDP stands for real GDP per capita; POP represents population

expenditure on education amounted to 0.48 per cent of GDP; total government expenditure amounted to 1.41 per cent of GDP; real GDP per capita amounted to USD 825; and population amounted to 15.27 million, the human flight and brain drain index is 1.62. Besides, while population has the highest variability; brain drain has the most consistent dataset.

Secondly, Table 3 illustrates the pairwise correlation among the variables under study. In spite of casual and preliminary, a few interesting observation can be noted. While government expenditure on education has the lowest correlation (-0.12) with brain drain; real GDP per capita has the highest correlation (-0.77) with brain drain among the explanatory variables in the model. Hence, as a preliminary indication, real GDP per capita tends to be very crucial in brain drain reduction. Another expected observation lies on the negative relationships between all explanatory variables and the dependent variable – brain drain, preliminary indicating that all of them negatively affect poverty.

Table 4 reveals the main result (total score of 12 political risk indicators and brain drain) as well as results of institutions - brain drain in the aspect of institutional components, where “lnBD_{it-1}” refers to the lagged dependent variable (lagged human flight and brain drain index).

Panel (1) depicts the dynamic panel estimation main result regarding to institutions (total score of 12 political risk indicators) and brain drain. The estimated coefficient of “INST” suggests its elasticity of -0.45, indicating that a ten per cent increase in quality of institutions is associated with a reduction in poverty headcount ratio by

Table 4 Dynamic Panel Estimation Results of Two-Step System GMM – Institutions and Brain Drain (Main Result and Additional Individual Analysis on CC, BQ, LO,GS, IP, SC)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|-----------------------|----------------------|---------------------|---------------------|---------------------|----------------------|----------------------|---------------------|
| ln.BD _{it-1} | 0.51*** (25.76) | -0.42*** (10.86) | 0.79*** (31.78) | 0.70*** (19.52) | 0.38*** (16.50) | 0.86*** (31.77) | 0.615*** (12.16) |
| lnINST | -0.45*** (-9.52) | | | | | | |
| lnCC | | 0.42*** (5.25) | | | | | |
| lnBQ | | | -0.18** (-2.03) | | | | |
| lnLO | | | | -0.24*** (-4.78) | | | |
| lnGS | | | | | -0.10*** (-3.34) | | |
| lnIP | | | | | | -0.13*** (-15.62) | |
| lnSC | | | | | | | -0.72*** (-4.91) |
| lnGEE | 0.16*** (33.76) | -0.18*** (-2.68) | 0.12*** (2.87) | 0.08*** (5.02) | -0.14*** (-3.50) | -0.18*** (5.49) | -0.20*** (-5.15) |
| lnGE | -0.03*** (-6.88) | -0.07** (-2.14) | -0.007 (-0.70) | -0.002 (-0.17) | -0.08*** (-4.56) | -0.006 (1.04) | -0.04*** (-2.93) |
| lnRGDP | -0.19*** (-11.52) | -0.21*** (-4.24) | -0.04*** (-4.18) | -0.12*** (-4.01) | -0.26*** (-13.28) | -0.06*** (-5.24) | 0.02 (0.46) |
| lnPOP | -0.09*** (-16.79) | -0.07* (-1.96) | 0.01 (0.77) | -0.05*** (-4.96) | -0.07*** (-3.83) | -0.03* (-1.87) | 0.002 (0.09) |
| Constant | 5.68*** (14.83) | 78.93** (9.85) | 12.23*** (5.45) | 2.54*** (6.44) | 7.281** (2.03) | -5.11** (-2.51) | 1.97*** (2.87) |
| Hansen Test | 38.43 (0.41) | 32.34 (0.40) | 29.04 (0.31) | 25.42 (0.50) | 35.54 (0.58) | 29.43 (0.73) | 27.10 (0.62) |
| AR(1) | -3.20*** (0.001) | 2.17** (0.02) | -3.69*** (0.00) | -3.54*** (0.00) | -3.04** (0.002) | -3.08*** (0.002) | -2.77*** (0.006) |
| AR(2) | -0.88 (0.38) | -0.78 (0.44) | -1.62 (0.11) | -1.73* (0.08) | -1.58 (0.11) | -1.06 (0.29) | -1.61 (0.11) |

Notes: Figures in parentheses are Z statistics. ***, ** and * indicate statistical significance at 1%, 5% and 10% level respectively

4.50%, *ceteris paribus*. Therefore, the first key message emanates from the regression results, is that institutions are indeed, essential in the goal and efforts of brain drain reduction. This finding substantiates the existing literature that document the importance of institutions in brain drain reduction (Zweig, 2006; Docquier et al., 2007; Tessema, 2010; Dutta & Roy, 2011; Dimant et al., 2013; Ariu et al., 2016; Nejad & Young, 2016; Bailey & Mulder, 2017). As coined by Bailey and Mulder (2017), there is a need to link highly skilled migration to issues associated with policy and institutions as the multidimensionality of institutions provides us the feasibility to investigate the diverse nature of brain drain.

For an example, political instability (in home countries) on one hand, determine the decisions of skilled workers to emigrate to other countries (Dutta & Roy, 2011); on the other hand, it explains why immigrants in destination countries choose not to return to the home countries, and why the subsequent improvement in the gov-

ernment policy and political stability in the home appears to attract returnees from the destination (Bang & Mitra, 2011). In other words, political instability tends to undermine the ability of civil service entities to induce and retain skilled workers (Tessema, 2010). Another research, supporting the finding that quality of institutions attracts skilled immigrants to the destination countries, is documented by Nejad and Young (2016). According to the authors, in particular, economic freedom, legal system and property rights improvement serve as a pull factor for potential migrants.

Apart from this result, another interesting observation stems from the contradicting results of different government expenditure on skilled migration. While the total government expenditure (GE) is found to reduce brain drain; government expenditure on education tends to raise the level of skilled migration. This contradiction could be explained by the notion that a higher public investment, including investment on infrastructure, upgrading public service, and others alike, offers a sense of stability, security, flexibility, and convenience to those talents. This, in turn, motivates them to stay in their home countries. On the contrary, a higher investment in education, including scholarship for overseas study, will increase the likelihood of talents to further studies abroad and hence stay abroad permanently if they used to adapt to the destination where they study in. Other than that, both the enlargement in real GDP per capita ($\ln\text{RGDP}$), as well as total population ($\ln\text{POP}$) are found to reduce brain drain, suggesting that the greater is the economic development and market size of a nation, the lower would be the amount of skilled emigration. This finding fares well with Zweig (2006); Docquier et al., (2007); Bang and Mitra (2011); Beine et al. (2014); Harnoss (2017).

The evidence for the skilled workers retention effects of institutions is further reaffirmed after splitting institutions into individual components for analysis purpose. Panel (2) to Panel (7) in Table 4 illustrate the dynamic panel estimation results of Two-Step System GMM for institutions and brain drain (human flight and brain drain index) in the context of individual (institutional components) analysis namely control of corruption (CC in Panel (2)), bureaucracy quality (BQ in Panel (3)), law and order (LO in Panel (4)), government stability (GS in Panel (5)), investment profile (IP in Panel (6)), and socioeconomic condition (SC in Panel (7)). Based on the table, it is observed that majority of the institutional elements - law and order (Ariu et al., 2016), government stability (Tessema, 2010; Dutta & Roy, 2011; Bang & Mitra, 2011), investment profile (Tessema, 2010; Dutta & Roy, 2011; Bang & Mitra, 2011), bureaucracy quality (Bang & Mitra, 2011), and socioeconomic condition (Tessema, 2010; Dutta & Roy, 2011) have negative effects on skilled migration, and are consistent to the literature; except for control of corruption which has a positive effect on skilled migration - better control of corruption exacerbates brain drain issue. In overall, the results of individual analysis from the aspects of both significance and magnitude do not deviate extensively from the main result (Panel (1)).

It is completely reasonable that law and order, government stability, bureaucracy quality, socio-economic condition, and investment profile mean a lot to the emigrating group of population. According to Dutta and Roy (2011) as well as Bang and Mitra (2011), for an instance, a more stable government is the one who perform duties more productively and can stay in office in a longer time period. This will ensure (source) nation with a stable working environment and an efficient infrastructure. By

contrast, a less responsive government hesitates in its public policy implementation and hence disappointing its citizens. Following that, the highly skilled portion of the disappointed work force finds themselves easier, stable, and more rewarding to switch to better opportunities which normally happen to be the safe environment in the developed world.

In addition, a higher level of bureaucratic quality implies a greater perception of legitimacy of the government in terms of its capability in delivering effective and efficient public services, thereby leading the group of skilled indigenous labor to have lower incentive to migrate (retaining talents). A high government's bureaucratic quality is not only able to retain and attract talents, but it is also able to induce the set up of business in a nation (Zweig, 2006) which in turn, attracts skilled immigrants.

Furthermore, desirable socio-economic conditions suggest that the role of government in the society is limited. Particularly, better job opportunities, lower rate of poverty, as well as higher consumption (consumer confidence) guarantee talents a bright and secure future, hence lowering brain drain. High-skilled labors also concern on investment profile which indicates the ability of government in providing a desirable environment for private enterprises – institutional quality that influence private investment and FDI. Particularly, the concern is mainly on investment risk like contract violability or expropriation, profit repatriation, and postpone of payments. Lower investment risk implies that investors get back their fruits of investment (Bang & Mitra, 2011).

One of the interesting results of the study is that control of corruption has positive effect on skilled emigration - the better is the control of corruption, the more skilled workers will depart from the home countries, vice versa. This surprising empirical finding is not without theoretical support. In fact, the notion that corruption could be efficiency enhancing, has a long tradition in the economic literature. According to Aidt (2003), for instance, corruption enables individuals to work around misleading government policies as well as red tape, and thus it is considered as a wise market response to preexisting government failures. In turn, the overcoming of the limitation brought by the ineffective and inefficient policies could motivate skilled workers to stay in the home countries. Another study which supports corruption's "greasing the wheel" hypothesis is Ariu et al. (2016).

By contrast, corruption was also found to be "putting sand on the wheel" (Poprawe, 2015; Cebula, 2002). In other words, corruption serves as a push factor for migration. According to Poprawe (2015), individuals will migrate to communities that best represent their set of preferences. Corruption tends to encourage high-skill emigration (and discourage immigration) because it triggers a lower quality of life, higher insecurity, as well as worse and vulnerable economic circumstances in the home countries (Poprawe, 2015).

To sum up, the empirical results established on how institutions can essentially be a valid reason for skilled workers to stay in the home countries. With a high institutional quality, a nation not only could prevent the outflows of talents, but also could attract talents elsewhere. The finding is on one hand, on par with the literature; on the other hand, it also generally holds in the case of individual analysis on the institutional components. Most of the institutional elements were found to have negative effect on brain drain as expected, except for control of corruption. The reinforcement

of the individual regression results suggests that without a strong institutional structure, it is difficult for a nation to retain skilled labors.

However, the results of this study might be limited by the notion of one-size-does-not-fit-for-all. In other words, the results – negative impact of institutions on brain drain, may not be applicable to all countries, based on different categories like income level, continents etc. Future researchers could consider to categorize the sample under study based on income status namely high-income, middle income and low-income. In addition, due to the panel nature of the data, the variables and hence the regression might suffer from the issue of cross-sectional dependence. As a result, any further study would involve the common correlated effects mean group method (CCEMG), in the analysis, in order to overcome the said issue.

5 Conclusion

The study is motivated by the burning question: in spite of the varying descriptions on skilled migration, ranging from general economic and social implications to context-specific policy responses, why do certain nations fail to tackle the pull and push forces behind it? It investigates the impact of institutions on brain drain in 100 nations during the 2007–2019 period using the system GMM estimators. The key finding of the study is that institutions, coupled with government expenditure, real GDP per capita, and population affected brain drain negatively in a significant manner; while government expenditure on education had significant positive effects on brain drain. This finding, is on one hand, on par with the literature while on the other hand, it also holds in the case of individual analysis on institutional measures, except for the component of control over corruption. This study also established how quality of institutions can be a valid reason, other than economic (government expenditure, real GDP per capita) and social factors (population), for skilled workers to stay in home countries. With a high institutional quality, a nation not only could prevent the outflow of talents, but also could attract talents from elsewhere. Accordingly, the recognition of the roles played by institutional quality in explaining skilled migration has some important implications for the development of countries. Skilled labors, especially from the LDCs and the developing countries, emigrate to the developed world partly for the sake of high institutional quality. These nations undoubtedly need a skilled indigenous work force to sustain their own growth path, given their relatively poor and inefficient governments. The findings serve as the answer for the study's research questions of (1) Are institutions a factor of brain drain?; & (2) Can institutional quality retain and attract talents?.

Thus, in order to retain a large-scale creation of sustainable, a highly-skilled labor force, it is advisable for the home countries' governments to create an institutionally and politically sound environment, other than just spending more on promoting economic growth and increasing population. This is because a low quality of institutions is a push factor of brain drain, regardless of the nation's economic performance. The majority of the emigration from the developing economies to the developed world does not happen in search of only better intellectual, economic, or educational oppor-

tunities. Such decisions, however are also essentially shaped by persistent political, religious, or ethnic unrest back at home.

Nevertheless, future studies are advised to implement a more appropriate instrumental strategy to capture the potential reverse causality of the institutions-brain drain nexus which might be due to the opinions of emigrants overseas and increasing incentives for the elite to improve institutional quality as a result of rising emigration rates. This issue, in turn, points to the need to analyze the drivers of institutional reforms and the mechanisms. If institutions are empirically proven to have strong impacts on brain drain, then a better understanding of what leads to their changes, does matter. It would also be more appropriate to evaluate the conditions that make migration a desirable decision; rather than only investigating the factors preventing migration because the relationship between migration and development is reciprocal. Once individuals start to emigrate, they could transform the domestic development which, in turn, could reshape individuals' motivation to emigrate through the creation of migration networks, technological bridges, as well as skills diffusion. If scholars and policy makers are really concerned about brain drain, and not merely using it as an excuse to maintain exclusionary migration practices or to avoid duties of global distributive justice, they should analyze migration as a whole by exploring its interaction with institutions and hence the combined effects on development. Migration can be part of the development strategy, only with broader national and local institutional reforms which promote investment and return migration. Lastly, it is necessary for future researchers to note that an even wider range of institutions is employable. Among the other sources of institutional variables include the Worldwide Governance Indicators (WGI), and Transparency International. Robustness checking by using different proxies from these distinctive sources provides validity of the results obtained. Although the recognition of multi-dimensional institutions is crucial, future studies also should not ignore the danger of overly homogenizing each of the institutional elements. Although some of the elements may occur in most nations especially those located in identical regions; resources, business patterns, national contexts, culture, and ethnic diversity will still lead to different shapes, and unfold in a different manner across nations or even states within a country.

Declarations

Competing interest The authors have no competing interests to declare that are relevant to the content of this article.

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