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## **Offshore enrolment in higher education and migration**

Some evidence from Australia

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### Abstract

This paper presents empirical evidence on the relationship between enrolment in transnational higher education (TNE) and subsequent skilled migration to the country that provided the educational services. Based on macro-level panel data, the analysis shows a close link between offshore enrolment in Australian higher education and subsequent skilled migration to Australia, suggesting that countries may successfully use the provision of higher education outside their borders to enlarge skilled migrant recruitment. Although further research on the issue is needed, this paper represents the first step in the exploration of an issue of particular interest for both developed and developing countries, constituting an original contribution to the current debate on skilled migration, student mobility, and new trends in the higher education sector.

**Keywords:** Skilled migration; transnational higher education; offshore enrolment; Australia; student mobility.

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# 1 Introduction

Often called ‘brain drain’ – skilled migration has been an important issue since the 60s due to the importance of skilled people for the socio-economic development of a country. Skilled migration has received renewed attention in the last two decades, especially as developed economies’ become increasingly interested in attracting skilled individuals from abroad. The specialisation of many OECD countries in human capital-intensive activities together with the pressure of their ageing populations on welfare systems has caused many countries to redesign their immigration policies to be more skill-selective and actively attract skilled migrants.

In this context, international students are increasingly considered a valuable source of potential skilled migration to the countries where they have studied. There are several advantages for host-country employers recruiting former international students: they have recognisable qualifications from known educational entities (Kuptsch, 2006); they are already integrated into the host society; they know the language; and they have already established social ties. Several OECD countries have therefore eased their immigration policies to allow international students to remain in the host country and seek work after completing their studies, and taken measures to attract students from abroad.

To expand recruitment, several higher education institutions from OECD countries have begun offering educational services ‘offshore’ (i.e. in other countries) through the establishment of branch campuses and/or offering courses abroad. The supply of transnational education (TNE) services is an easy way to grow enrolment ‘while avoiding home campus capacity constraints’ (Ziguras and McBurnie, 2008: 5). In comparison, the countries that have opened their markets to foreign education institutions do so to satisfy higher education demands not being met by existing local providers; enhance the quality of higher education to increase tertiary enrolment; decrease student emigration; and become a destination country for international students (Wilkins and Huisman, 2011).

In light of these recent developments in the higher education industry, it is interesting to investigate if and how they may reshape the current scenario of skilled migration. To date this issue has been empirically neglected. Using macro-level data for the Australian case, this paper contributes to filling this gap by conducting a quantitative analysis of the relationship between TNE and skilled migration. In particular, it is concerned with the association between enrolment in Australian TNE and subsequent skilled migration to Australia.

Section 2 offers a review of the literature focused on the relationship between education and skilled migration addressed in the literature to date. It also briefly presents the very recent debate on how these new trends in higher education could influence the mobility of students and skilled individuals. Section 3 defines TNE and its rationale. Section 4 presents the hypothesis that leads this research and the theoretical assumptions on which it is based, and section 5 explains the choice of Australia as a case study. The methodology and the data used are presented in the sections 6 and 7 respectively. Section 8 is a discussion of the results, and the conclusions are in the last session.

## 2 Literature review

The theoretical debate around skilled migration is rooted in the broader literature on international migration. Although specific literature on skilled migration exists, it generally focuses on its impact in origin countries. More recently, a number of studies have aimed to identify the mechanisms that

determine the existence and perpetuation of skilled migration flows. There has only been some research focused on studying the relationship between skilled migration and education.

## 2.1 Drivers of skilled migration

Massey et al. (1993) were the first to systematically review contemporary theories of international migration, separating between theories of why migration begins and why migration continues to take place.

Numerous theoretical explanations have been proposed to explain what causes international migration to begin. The neoclassical migration model conceives international migration as the result of differences in wages and employment between countries at the macro level, predicting that workers from low-wage countries move to high-wage countries (Harris and Todaro, 1970; Todaro, 1976). It thus predicts that a rise in GDP per capita in the origin country reduces the incentive to emigrate. Equally, international flows of skilled workers respond to differences in the rate of return to human capital. At the micro level, this theory considers migration as an individual rational decision made to maximise income (Sjaastad, 1962).

According to Borjas (1990), migrants evaluate the costs and benefits of moving to alternative destinations and migrate where the net returns are greatest. Costs related to migration are usually calculated on the geographical distance between countries of origin and destination, colonial links, and linguistic proximity – where the more knowledge of a country and its culture means a better chance of finding a job. The neoclassical theory of migration is normally modelled using the ‘push-pull model’ and empirically implemented with the gravity equation (Karemera et al., 2000; Mayda, 2005; Lewer and Berg, 2008; Bessey, 2012). Mayda (2005) finds that improved income opportunities in the destination country significantly increases emigration rates, even when considering destination countries with restrictive immigration policies. The neoclassical model has been particularly critiqued on the basis that economic growth in developing countries has shown in some cases increased migration due to a reduction of financial restrictions (Lopez and Schiff, 1998; Rotte and Vogler, 2000; Mayda, 2005).

In absence of significant wage differentials, the new economics of migration (NELM) theory explains migration not based on individuals’ decisions, rather as a household strategy to minimise risks and overcome market failures, not only of the labour markets (Taylor, 1999). According to NELM, income inequality and relative deprivation within sending societies play a major role in determining migration (Stark and Taylor, 1989). NELM theorises that households send workers abroad to improve their relative income compared to the households of reference groups (Stark and Taylor, 1989). Although different in their assumptions, these two theories explain migration as a rational decision taken at the micro-level, a prevalent approach in the empirical literature on skilled migration. There is also a consensus that not only economic factors influence this choice. As Docquier and Rapoport (2012: 285) note, ‘some skilled individuals emigrate because they would be unemployed or ineffectively employed in the origin country (the ‘brain-waste’ phenomenon), or to escape corruption, violence or discrimination’.

Other theories focus on structural forces that operate at the national and international levels. The segmented labour market theory (Piore, 1979) for example, connects immigration to the division of the labour market and the need of developed countries for cheap immigrant workers (pull factors/demand side). In this sense, international migration is initiated by active recruitment in developed countries or by governments operating on employers’ behalves. In line with this, several

authors have explained increased skilled migration by pointing to changes in immigration policies introduced in main destination countries, which are increasingly selective and favour skilled workers (see Abella, 2006; Taran, 2007; Zeugin and Van Dok, 2007). They argue that selective immigration policies represent a main cause of the skilled mobility phenomenon and explain why, in the last two decades, the number of highly skilled migrants is higher than any other category of immigrants (low and middle skilled).<sup>1</sup>

However, Brücker et al. (2012) argue that the admission of skilled workers may not be enough to attract them, as the volume of skilled migration is not determined solely by demand. According to the world system theory, migration is the natural consequence of economic globalisation and the market penetration of capitalist businesses to peripheral poor countries. According to this theory, international migration flows have little to do with wage differentials; rather they follow the dynamics of the international market and the structure of the world economy. Sassen (1988: 7-21; 119) states, to fully understand what mechanisms explain migration it is necessary to research the ‘context of linkages’ – the structural and ideological linkages existing between sending and receiving countries and in which way they have been established. Sassen individualises foreign investment as a migration push factor if directed towards labour-intensive export-oriented sectors, because it devastates traditional work structures and it causes ‘westernization effects’. Workers of an offshore plant or office producing goods for people and firms in highly industrialized countries, may begin to consider emigration as an actual option. Subsequent research has empirically shown how flows of people are closely related to flows of goods and foreign direct investment (Checchi et al., 2007).

As Massey et al. (1993) argue; ‘different theories of migration are not necessarily mutually exclusive’ (de Haas, 2011: 15). Indeed, it is totally conceivable ‘that individuals act to maximise income, while families to minimise risks’ (Massey et al., 1993: 433). It is also quite logic that the need for workers on the demand side influences the choices of potential migrants, although this impact is probably bound to the possibility of obtaining information about visas, opportunities, and the job market in destination countries. In this sense, the exploration of Sassen’s ‘context of linkages’ can be a valuable strategy.

The network theory (a theory of why migration perpetuates) argues that networks have a key role in sharing information about opportunities and changes in the legal framework of the destination country (Massey et al., 1993). These networks often also materially assist the migrant after the migration is realised (see Hatton, 2003; Mitchell and Pain, 2003; Clark et al., 2002; Pedersen et al., 2008). This explains why migrants tend to immigrate to destinations where there is a well-established community of nationals (Beine et al., 2011; Bertoli, 2010). It should be noted that the experience of former migrants can also stimulate herding behaviour, augmenting the desire of others to have the same experience.

As de Haas (2011: 32) argues, the experience itself can be also an important motive to move, especially for young educated people. Access to information can constitute the seed of desire to emigrate; it can equally constitute a way to realise an existing desire. From a purely theoretical perspective, Pellegrino (2002) suggests that one of the main causes of increased skilled migration could be greater access to information, and particularly the spread of new information and communication technologies (ICTs) that provokes a sort of ‘homogenisation of expectations’ [own

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<sup>1</sup> The cause of this is also certainly related to the underestimation in the official statistics of “non-legal migrants” which are normally low or middle-skilled.

translation], generating favourable conditions to plan an emigration (Pellegrino, 2002). Others scholars also argue that improvements in communication and the declining costs of transportation have reduced the effects of 'distance' and increase the capability of people to move (Pedersen et al., 2004: 2). This necessary combination of desire and capability to migrate is discussed by de Haas (2011: 21; 32), who claims that an improved theoretical model of migration should conceive migration as a function of aspirations and capabilities within a concrete structure of opportunities (at the micro and at the macro levels). For de Haas, access to information and education becomes fundamental.

## 2.2 Higher education, student mobility and skilled migration

Education can be considered one of the most important factors related to the phenomenon of skilled migration. The adjective 'skilled' generally refers *strictu sensu* to qualifications acquired in the higher education system. Close linkages between education and skilled migration have long been established in the literature.

The degradation of higher education systems in many developing countries has been identified as one of the main 'push factors' causing people to emigrate to receive education abroad (Agarwal and Winkler, 1985; McMahan, 1992; Mazzarol and Soutar, 2002, 82).

The brain drain literature also often points out that skilled emigration causes a worsening of welfare and public services in origin countries; this being especially worrying for the sustainability of their health and education sectors. Hence, as argued recently by Docquier and Rapoport (2012), the global competition for talent could weaken the capacity of sending countries to invest in public education.

Literature on skilled migration as a brain gain has in turn focused on the possible positive impacts of the migration prospects on the individual investments in origin countries, which stimulate and foster human capital accumulation (Stark et al., 1998; Vidal, 1998; Beine et al., 2001). Firstly, the possibility to receive good returns for education abroad promotes skill acquisition in the origin country (Stark et al., 1998). In this sense, selective immigration policies in main destination countries could induce people to invest in education 'in order to be eligible for migration' (Mountfort, 1997; Chand and Clemens, 2008). In this case, as argued by Stark and Wang (2002), the prospect of migration acts like a subsidy which increases the level of education of individuals in the origin countries.

The effect of skilled emigration on human capital accumulation is thus, ambivalent: it may erode the financial ability of a country to invest in public education, but it can also cause individuals to acquire educational qualifications.

As some scholars argue (Rosenzweig, 2008; Docquier and Rapoport, 2012), it is also possible that skilled migration prospects lead more individuals to invest in secondary education in the origin country to have the option of studying abroad at the tertiary level. Indeed, the seed of skilled emigration lies often in International student mobility. In their analysis on student flows and migration, Dreher and Poutvaara (2005; 2011) demonstrated how the number of foreign students studying in the US is a good predictor of skilled immigration. Rosenzweig (2008) similarly notes that international students are likely to stay in the host country to work after completing their studies. As noted by the same scholar in a previous study (2005), foreign education provides its owners with a

higher probability of finding a job in the training countries due to better recognition of the diploma, knowledge of the culture and language, network ties, etc.

It is not clear if people decide to study abroad to facilitate their emigration project (which precedes the decision to study abroad), or if the non-return decision is due to circumstances that occur during or after the period of study abroad. Past research on the causes of non-return of many international students has connected non-return with the problem of 'second acculturation', i.e. the difficulty that many ex-international students have re-adapting themselves to the home culture after living a long period abroad: the difficult 're-entry transition' (Viguiet, 1966; Arthur, 2003).

The decision to stay in the training country is thus explained by a change in aspirations. Although, this decision could also be connected to the fact that the training received is not adapted to the needs of the home country labour market. In this case, the decision is explained by the difficulty (or incapability) to return to the home country. In contrast, Coulon and Paivandi (2003: 45) argue that international students often leave their home country with a 'residential strategy': they study abroad in order to stay there afterwards. As the two authors remark, some students use the university enrolment as a strategy to realise their aspirations to expatriate. Nonetheless, they also note that some people choose to study a specific degree based on the needs of their home country as a strategy to return there and find a job (*ibid.*). It is quite obvious that a link exists between education decisions and long-term employment aspirations (Hashim, 2007).

## 2.3 New trends in higher education and skilled migration

According to Özden and Schiff (2006: 151), the cost of public education (at every level) to origin countries for the education of skilled individuals who leave the country to work abroad, has negative financial consequences for sending countries. According to the World Bank, this constitutes one of the most important concerns raised by the departure of skilled professionals from developing countries (2007). In this sense, the opening up of the higher education market to private or foreign providers is often cited as one policy recommendation to ensure the benefits associated with the prospect of emigrating on human capital accumulation, but also mitigate the cost of public higher education.

This has led to a worldwide trend to greater 'cost-sharing' (Bray, 2000; Johnstone, 2004): more private universities, a reduction in public spending in education, and a larger share of the cost of education borne by the student through the increase of a tuition-dependent higher education sector.

Private higher education expansion is often closely related with internationalization. In the absence of legitimacy coming from a historical university tradition or from government, private higher education institutions normally build their legitimacy pursuing accreditation from foreign agencies (often US ones) or emphasising the validity of their model in the international scene. For this reason, international partnerships develop between developed and developing country institutions in the form of a partnership between a foreign university and a domestic private college (see Levy, 2006: 12). Furthermore, the privatisation of higher education services entails their automatic inclusion in the GATS-WTO (General Agreement of Trade in Services) that allows foreign providers to provide services in another country through GATS-WTO Mode 3, and permits individual's temporary migration to provide services in foreign countries through Mode 4.

In this context, the phenomenon of transnational education (TNE), i.e. the provision of education services in a different country to that where the institution providing the education is based,



is increasing. Its potential effects on skilled emigration are still empirically understudied due to the difficulty finding harmonised and comparable data on this issue. Thus, until now this debate has remained speculative. Kapur and Crowley (2008: 28-29) contend that TNE can promote the retention of home country students, who would have otherwise gone overseas and 'spent money there' with clear benefits for the country of origin. Effectively, if a cause of non-return is problematic re-adaptation of ex-international students in their home culture (Viguiet, 1966), the possibility to study at an international institution in their origin country may reduce permanent emigration of tertiary educated people, thus helping countries retain their human resources (Vincent-Lancrin, 2005).

Other scholars are more sceptical. Stein (1996) argues that participation in international education and training 'has stimulated the interest of young scientists to work abroad'. Nussbaum Voehl and Mollis (2007) further argue that people trained at a foreign institution will be more advanced in a foreign context, thus easily attracted by the prospect of emigration. According to Chiang (2012), TNE could constitute a 'Trojan Horse' that might 'aggravate rather than diminish student mobility and brain drain', and 'accentuate rather than alleviate the influence of western culture on East-Asia'. According to Venturini (2012: 304) 'the foreign student programmes implemented by the US, Canada, Australia and UK favour the development of educated workers that are somewhat connected (at least language) to the country where they studied'. This, paired with their selective immigration policies, likely increases skilled immigration. It is possible however, TNE also connects students of these programmes with the country of the higher education institution attended. Additionally, TNE makes qualifications more transportable internationally which increases capabilities to move (Vincent-Lancrin, 2008).

As Becker (2012) states, research on skilled migration should reflect on if and how these new trends in the higher education industry influence this kind of mobility. This paper thus offers an empirical analysis of the relationship between these two phenomena.

### **3 Transnational higher education: definition and *rationale***

The term 'transnational education' includes the entrepreneurial partnerships between universities of different countries, an increasing mobility of professors and students, and the possibility for foreign investors to enter the 'education market' of a country.

One of the first definitions of TNE is from The Global Alliance for TNE (GATE):

TNE denotes any teaching or learning activity in which the students are in a different country (the host country) to that in which the institution providing the education is based (the home country). This situation requires that national boundaries be crossed by information about the education, and by staff and/or educational materials. (GATE, 1997: 1)

The principal motivations for governments opening their higher education market to foreign providers is to increase higher education enrolment, to satisfy the demand for higher education, and 'to retain student outflows and the possible consequent brain drain' (Wilkins and Huisman, 2011: 300-301). Governments also seek to develop knowledge-based economies (Welch 2011) that attract students from abroad (Waring, 2013). In this way, some traditional source countries of international students have become 'global education hubs' in recent decades; such as Malaysia, Singapore, Qatar, the United Arab Emirates, and more recently Hong Kong, China, South Korea, Saudi Arabia, Kuwait, Bahrain and Oman have also started to open their educational market to foreign providers.

For higher education institutions, offshore expansion is a way to increase enrolment, but it can be a risky strategy that may also imply financial losses and have reputational consequences (Wilkins and Huisman, 2012). For the institutions' country, the possibility of intensifying recruitment abroad represents not only a financial gain, but also helps develop international relationships, building up an alumni community of future business leaders and professionals linked to their country.<sup>2</sup> Furthermore, the international student market (including 'offshore') may also be a solution to skills shortages in key areas (Stromquis, 2007).

## 4 Theoretical considerations

This paper aims to identify if there is a relationship between enrolment in TNE and skilled migration. This paper uses macro-level data to explore the relationship between the number of individuals enrolled in TNE from one country and the subsequent migration of individuals from this country to the country of the TNE provider.

Although the research is collected at the macro-level, the hypothesis of this paper relies on some theoretical considerations that concern macro-level dynamics as well as some assumptions on individual-level behaviours and decision-making.

The first reflection concerns how migration is conceived. Following de Haas (2011), migration is considered a function of the aspiration and capability to migrate. This leads to the assumption that individuals who want to study abroad and can afford to, may do so even with a TNE institution or programme in their home country (Figure 1). Hence, it is possible to hypothesise that TNE reaches people who do not want to emigrate (or prefer to study in their home country) and/or cannot afford to migrate to study (or can only afford emigration to a closer country where TNE is available). In the absence TNE in country, people may not have the possibility to study at all (and thus remain 'unskilled'), or may choose to study in a national higher education institution. In summary, the study assumes TNE students do not have the aspiration and/or capability to migrate for study and therefore are not the same clientele that study abroad.

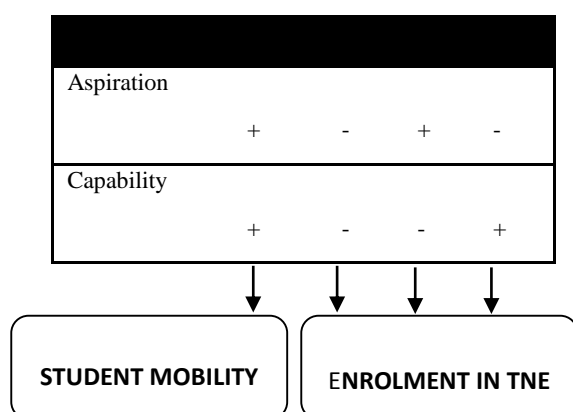
The targeting of people who do not have the aspiration and/or capability to study abroad by TNE is demonstrated by the agencies that export education. In a discussion paper by the International Education Advisory Council, an agency established by the Australian government to offer expertise on the internationalisation process of Australian higher education states:

TNE offers students who are unable or unwilling to acquire their qualification in Australia access to a more diverse range of quality programs than those available in their home country, including the opportunity to undertake tuition in English (International Education Advisory Council 2011, 17; emphasis is mine).

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<sup>2</sup> For examples, please consult the Australian Education International website: <https://aei.gov.au/About-AEI/Offshore-Support/Pages/TransnationalEducation.aspx> (last reviewed on 21st June 2013).

**Figure 1: Attitudes towards emigration to study and enrolment in TNE**



If TNE is expanding international student recruitment, the claims TNE is a good way to retain potential international students in the home country fail, meaning the spread of TNE exposes more people to a foreign education experience.

The second assumption is that exposure to a foreign education creates ideological and structural connections with the education provider and its country. This may change migration aspirations and capabilities, influencing decision-making and motivations. The presence of TNE in one country can create links between people from the two countries, giving access to information about postgraduate education, job markets and the legal framework. The educational institution may also provide contacts with employers. According to Bagchi's (2001) examination of skilled migration to the US, weak ties, especially with potential employers, play a more important role for skilled people than contacts with relatives and friends abroad. Moreover, the qualifications obtained are normally recognised in the higher education provider's country and this can pave the way to future migration. Thus, the main hypothesis of this research is that:

*Enrolment in TNE of people from one country, corresponds to an increase in skilled migration from this country to the country of the institution that provided the education.*

The research considers exclusively Australia as skilled migration destination country for the reasons explained in the following section.

## 5 Case selection

Data on enrolment in transnational education are exclusively available at the aggregated level. Only two countries, the UK and Australia, collect data on students enrolled in TNE institutions operating offshore. Nevertheless, the differences between the measurements and the variables in the two datasets prevent comparison. UK data provided by HESA (Higher Education Statistics Agency) make a distinction between enrolment in programmes delivered in the framework of a partnership (franchising, twinning arrangement, etc.) and enrolment in UK branch campuses. This distinction is not made in Australian data, provided by the DIISRTE (Department of Industry, Innovation, Science, Research and Tertiary Education) of the Australian Government. However, the Australian data give information on enrolment by country of birth, whereas the UK data only counts how many people are studying in each country, not their country of origin. The Australian data are thus preferable as they allow the capture of the impact of push factors connected with the students' country of origin. As this paper considers transnational education as a whole, the distinction between partnered programmes and

branch campuses enrolment is not important. Australian data also covers a longer period of time – from 2002 to 2011 (whereas UK data are only from 2007).

**Figure 2: Worldwide Australian TNE presence, 2012**



Note: Needles indicate the countries where Australian HE courses are offered or where Australian HE institution are present. Source: Australian Education International (AEI) – Auslist: <http://auslist.deewr.gov.au/InteractiveMapSearch/InteractiveSearch.aspx> (last download 27.11.2012).

Furthermore, together with Canada and New Zealand, Australia can be considered a pioneer in the selection of migrants, and it is among the six main destination countries for skilled migrants. According to the OECD (2004), the Australian higher education sector has the second (after the US) highest international enrolment in the world, constituting its ‘third largest service export behind coal and iron’ (Nelson, 2003: 35). The presence of Australian TNE is also particularly important in Asia, the continent with the biggest supply of TNE.

## 5.1 Skilled migration to Australia

The stock of skilled migrants to Australia has risen in the last decades. As shown by Defoort (2009), the total stock of skilled migrants (aged over 25 years old) has increased from 628,086 in 1975 to 1,455,061 in 2000.

Skilled migrants can enter Australia through two schemes: the General Skilled Migration (GSM) scheme, or the Employer Nomination (ENS) scheme. Both include a wide range of permanent and temporary visa subclasses to be granted to skilled individuals offshore and onshore, each with their own characteristics and criteria leading to permanent residency in Australia.

The GSM scheme includes three main categories of visas<sup>3</sup>:

- Skilled Independent: for skilled workers who are not sponsored by any employer, state or territory, or family member. A visa holder can live and work permanently anywhere in Australia. Certain family members can be included in the application. They must score at least 60 points on the Points Test, which selects migrants on the basis of their age, skills, qualifications, English language ability and employability.
- State Sponsored: for those who have a sponsorship from a state or territory, for example for skilled people wishing to live and work in a regional or low population growth area.
- Skilled Australian Sponsored: for people unable to meet the Skilled Independent criteria but who have an eligible relative living in Australia willing to sponsor them. This visa has a points test to select applicants with characteristics needed in the Australian labour market.

In the framework of the ENS, Employer Sponsored Visas are granted to people who have an employer willing to sponsor them. This scheme enables Australian employers to nominate highly skilled overseas workers to fill positions that cannot be filled from the Australian labour market or through the employer's own training programmes. Another type of skilled visa is the Business Skilled Visa, which encourages successful business people to settle in Australia and develop new business opportunities. Moreover, there is also an additional small category of visa, the Distinguished Talent Visa for individuals with special or unique talents of benefit to Australia such as sport people, musicians, artists and designers, who are internationally recognized as outstanding in their field. While the two latter visa types are granted to special categories of immigrants and do not necessarily require a university degree, the other types of skilled visas require educational qualifications.

Traditionally, the Australian points system has been driven by the short-term needs of the local labour market. In response to the global financial crisis in 2008-2009, the skilled migration stream was revisited by the Rudd Government (2007-2010) to prioritise 'demand driven' skills, favouring migrants with employment arranged prior to their arrival (employer sponsored category) and people with skills considered to be in critical shortage in Australia.

## 5.2 Australian transnational education

Australia's engagement in international education began after World War II through the Colombo Plan. This Plan, focusing in the Asia-Pacific region and operating for over 30 years, helped more than 40,000 young people from the Asia Pacific region enter Australia to study. Since the mid-1980s, Australian institutions have begun to offer TNE. The term 'transnational higher education' first appeared in Australia to differentiate those students studying onshore (in Australia) and those enrolled in Australian institutions offshore (Stella and Woodhouse, 2011).

In 1994, the Australian Government established the Australian International Education Foundation (AIEF) to promote the internationalization of Australian education and the co-operation between Australia and other countries to encourage collaboration between academic and research institutions. In 1998 the AIEF became the Australian Education International (AEI). In 2010, the responsibility for the marketing and promotion of international education and training transferred from AEI to the Australian Trade Commission (AusTrade). In October 2011, the Australian

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<sup>3</sup> The information showed in this section with the description of the type of visas is fully taken from the web pages of the Australia Visa Bureau: <http://www.visabureau.com/australia/emigrate-to-australia.aspx> (last consulted June, 15 2013).

Government announced the establishment of the International Education Advisory Council, to provide advice on the challenges and opportunities facing the international education sector in Australia.

In recent decades, Australian universities have seen unprecedented growth in international student enrolments, especially in offshore programmes (IDP, 2002). Predominantly these programmes operate as Australian degrees either totally offshore or in combination offshore/onshore and are accredited through normal home university arrangements (Adams 1998: 4; 14). The Transnational Quality Strategy (TQS) framework was established in 2005 based on the principle that courses delivered transnationally should be equivalent in standards and outcomes to those delivered within Australia. All this is quite important because since 1998 immigrants who have an Australian degree received five extra-points in the point systems. From 1999, a further five points are granted for people holding a doctorate degree that involved a minimum of two years residence in Australia (Hawthorne, 2005).<sup>4</sup> According to OECD (2006) ‘almost half of the candidates admitted under Australia’s skilled migration programme hold an Australian degree’. People who decide to study in an Australian transnational programme or degree obtain a degree that is part of their national higher education system, but also recognised by the Australian government, which could make it easier to emigrate after completing the degree (Hawthorne, 2005).

## 6 Empirical model and estimation strategy

Following previous research, skilled migration from one country of origin ( $i$ ) to Australia in a year ( $t$ ) is modelled here as function of several determinants:

$$skillmigr_{it} = f[Stud_{it}(t - \tau), Econ_{it}, Demog_{it}, Leg_{it}, \alpha_i, \gamma_t, \varepsilon_{it}]$$

[1]

where  $Stud_{it}(t - \tau)$  indicates the stock of students from country  $i$  enrolled in Australian offshore higher education at a period of time sufficiently far from  $t$  in the past so that the current stock of students in  $t$  is not accounted for in the stock of skilled immigrants.  $Econ_{it}$  approximates the economic characteristics of  $i$ , whereas  $Demog_{it}$  indicates the stock of potential skilled emigrants.  $Leg_{ijt}$  controls for the legal framework for skilled immigration, but also for the existence of bilateral agreements between Australia and other countries that facilitate skilled immigration to Australia.  $\alpha_i$  is a country specific intercept (country ‘s fixed effects). It thus controls for time-invariant characteristics of country  $i$  that may or not influence the predictor variables. Examples of time-invariant characteristics are particular cultural or economic links with Australia, such as same commonwealth membership, common official language, and geographical distance. The equation includes also  $\gamma_t$  that controls for common time trends (time fixed effects).

Equation [2] constitutes the baseline of my empirical model:

$$\ln skillimm_{it} = \beta_0 + \beta_1 Offshoreenrol_{it-\tau} + \beta_2 GDPper\ capita_{it} + \beta_3 Demog_{it} + \beta_4 Bilagree_{it} + \alpha_i + \gamma_t + \varepsilon_{it}$$

[2]

where the dependent variable is defined as the number of people from country  $i$  who are granted an Australian skilled migration visa offshore. Counting only visas granted offshore can be considered a

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<sup>4</sup> The Australian point system changed again on the 1<sup>st</sup> of July 2011. The period analysed in this paper is from July 2002 to June 2011. Thus, the changes does not concern the analyses presented here.

reasonably accurate measure of skilled immigration because it excludes from the estimations ex-International students already living in Australia who may change status from a student visa to a skilled migrant visa onshore<sup>5</sup>. In this way, it is assured that the individuals counted are already “skilled” before enter Australia and that they were not living there in the period that precedes the grant of the visa<sup>6</sup>.

The main originality of the model is the introduction of the explanatory variable  $Offshoreenrol_{it-\tau}$ , which measures ‘total offshore enrolment in Australian higher education institutions’. This variable indicates the number of students enrolled one or two years before the year of observation of the dependent variable. From the total enrolment, the data used permits exclusion of first year students, because it is unlikely that they are eligible for a visa based on qualifications only one year after commencing their studies. Actually, higher education can be considered the process through which skills are acquired and a time (if we exclude first-year students, at least one or two years) might elapse between the observed values of this explanatory variable could result in a change in the dependent variable.

The model contains the following controls. To control for the level of wealth in the country that influences both the capability of people to access education and to afford an emigration, it considers  $GDPper\ capita_{it}$ . The stock of potential skilled emigrants ( $Demog_{it}$ ) is approximated by a variable that controls the total number of people enrolled in tertiary education. This measure can be considered a quite truthful way to control for the stock of potential skilled immigrants to Australia, who are normally fairly young, especially for the categories of skilled visas considered here. Actually, Australian immigration policies clearly favour the entrance of immigrants in their 20s and very early 30s. An alternative way to control for the total volume of skilled individuals in country  $i$  is to consider the stock of educated people. However, this information is only available for two years of the considered period, thus its use entails a lot of interpolations. This is an additional reason why the variable that measures the total stock of people enrolled in tertiary education is here preferred. However, for the sake of robustness, the results obtained with the alternative measure of  $Demog_{it}$  are also provided in the appendix. Finally,  $Bilagree_{it}$  accounts for bilateral agreement between  $i$  and Australia that can make migration easier.

A panel analysis using the fixed effects estimator (FE) is conducted. Panel data analysis is a suitable estimation strategy that allows to identify how the variables change through time and to control for unobserved heterogeneity in the cross-sectional and temporal dimension of the dataset. Fixed effect estimation assumes that the unobserved heterogeneous component in the regression is constant over time. Thus, it constitutes the appropriate method when the unobserved effect is non-random, as it should be the case of international migration. The use of fixed effects is also motivated by the fact that this paper is mostly interested in analysing changes within countries. Furthermore, previous studies have demonstrated how the fixed effects estimator outperforms heterogeneous estimators in term of prevision’s accuracy (Brücker and Siliverstovs, 2006). In all regressions, both types of fixed effects are included, i.e. origin country fixed effects ( $\alpha_i$ ) and time fixed effects ( $\gamma_t$ ). As

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<sup>5</sup> As the Australian Bureau of Statistics (2009) indicates, a high proportion of onshore skilled visa applicants (45% in the period 1997/98-2007/08) are ex-International students.

<sup>6</sup> It is possible that the measure includes ex-foreign students that have come back to their country of origin and immigrate to Australia in a second time. Nevertheless, as underlined by the Australian Bureau of Statistics (2009), skilled arrivals are normally very young (in the decade between 1997/98 and 2007/08 57% of arrivals were aged 29 years old and under); this let suppose the improbability of this migration pattern.

only one country of destination is considered, time fixed effects also control for the general trends in Australian immigration policies towards skilled individuals, such as changes in the total number of skilled workers admitted into the country.

Considering the recent developments in the literature (Santos Silva and Tenreyro, 2005; 2011), this paper analyses the relationship of my interest estimating the multiplicative version of the equation. In the case of heteroskedasticity and a significant proportion of zero values, the Poisson Pseudo-Maximum Likelihood (PPML) has been found to generate consistent estimates even when the distribution is not strictly Poisson and is more and more used in the literature (Bessey, 2012; Beine et al., 2011; Beine and Parsons, 2013). Hence, a panel data analysis is conducted estimating a fixed-effects (FE) Poisson pseudo-maximum likelihood regression with robust standard errors following Wooldridge (1999). For the sake of completeness, the log-log versions of the models are also provided; this approach has actually longer represented the standard way of dealing with the gravity equation's estimation.

## 7 Data

The panel used covers a 10-year period (2002-2011). As one of the explanatory variables considered in  $t-\tau$  the analysis concerns fewer years. From the country of origin in the dataset, I explicitly exclude New Zealand, because this country and Australia have had special arrangements in place to facilitate a free flow of people between them since the 1920s. In this way, New Zealand citizens are not counted in data on visas granted.

Data on skilled immigration to Australia are provided by the Australian Department of Immigration and Citizenship (DIAC) and concern skilled visas granted, including all the categories of visas given to skilled individuals.<sup>7</sup> The data allow exclusion of the estimation Business Skilled Visas and Distinguished Talent Visas which do not require a tertiary education.<sup>8</sup> The information available gives the number of skilled visas granted from June of one year to June of the following year, for example, that the observation for the year 2002 includes visas granted between 1 July 2002 and 30 June 2003.

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<sup>7</sup> The use of these data has both pro and contra. From one side, the data are collected by country of citizenship and this can led to a mismatch in the analysis because of the way the main independent variable is collected (by country of origin). The problem of the different way of classifying immigrants among countries constitutes one of the more problematic biases in migration datasets at a macro level (Carrington and Detragiache, 1998; Adams, 2003). A valid alternative for the purpose of this paper would be to use Census data. However, an approach based on census data is also far to be perfect because 'the information on entry year is often based on answers to an ambiguous question' (Rosenzweig, 2005: 9). Data on visa granted offer accurate information on the year of when the visa was granted. From DIAC, it is also possible to get data on skilled visa granted by country of birth for the considered period. Nonetheless, the information by country of birth concerns the total number of visa conceded both outside Australia (offshore) and in the country (onshore). This means that it includes people who are already living in Australia (ex-foreign onshore students for example) who are just changing or renewing their visa. The data I use on visa granted offshore (available by country of citizenship) allows to be sure that the number of individuals I count in my estimations includes only people who were living in a country different from Australia in the moment in which the visa was granted. Comparing the two datasets (by country of birth and by country of citizenship), the correlation between data on total (onshore and offshore) skilled visas granted by country of birth and by citizenship is extremely high (0.9441). This result encourages me to use the data on visas by country of citizenship which provide the useful information on where the individual was when the visa was granted.

<sup>8</sup> The estimations have been also done including this kind of visas on the dependent variable and the results are confirmed. As expected, the relationship is found to be stronger considering only the categories of visas considered. This is due by the fact that in the case of Business Skilled Visas and of Distinguished Talent Visas the hold of a university qualification is not an essential requirement.



Data on offshore and onshore enrolment and commencements in Australian higher education institutions are provided by country of origin of the students by the Australian Department of Industry, Innovation, Science, Research and Tertiary Education (DIIRSTE). The data includes every country in the world and can distinguish offshore and onshore enrolment and commencement (separately) at a very detailed level. The educational levels are grouped in two broader categories according to the ASCED 2001 (Australian Standard Classification of Education) in this paper. The criterion used were the entry requirement: if the entry requirement supposes some university degree, the enrolment will be included in ‘postgraduate’, whereas if the entry requirement is secondary education (12 years of schooling), it will be considered as ‘undergraduate’.<sup>9</sup> ‘Total enrolment’ includes enrolment in these two categories and excludes enrolment in non-award courses, i.e. courses that did not lead to a qualification.

Concerning the other variables, data on GDP per capita from the World Bank Development Indicators is used. Data on tertiary enrolment are taken from the UNESCO/UIS database, whereas data on stocks of educated people come from the dataset by Barro and Lee (2010)<sup>10</sup> on educational attainment for population aged 15 and over. The dataset provides information every five years, thus the values for the remaining years are interpolated. The variable that controls for bilateral agreement is a dummy variable = 1 if there is a bilateral Social Security Agreement between the country of origin and Australia. As stated in the texts of the treaties, this kind of agreement explicitly aims to facilitate people-to-people contact and exchange’ between Australia and other countries, ‘to strengthen bilateral relations, and provide choices in retirement for individuals who have or will migrate to Australia during their working lives’. Under these agreements, ‘residents of Australia and of the signing countries that stipulate them will be able to move between Australia and the signing country with the knowledge that their right to benefits is recognised in both countries’. This kind of opportunity is considered to favour a more positive attitude of people towards labour migration in and towards a particular country.<sup>11</sup> Information comes from the Australian Treaties Database (ATD) of the Department of Foreign Affairs and Trade of the Australian Government.

All variables, their precise definition and data sources are listed in the appendix. Since some of the variables are not available for all countries, the number of observations will depend on the choice of the explanatory variables included in the analyses.

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<sup>9</sup> Undergraduate includes: Bachelor (Honours & Pass) Degree; Enabling Course at Bachelor Degree Level; Advanced Diploma, Diploma and Associate Degree Level; Enabling Courses at Advanced Diploma, Diploma and Associate Degree Level. Postgraduate includes: Higher Doctorate; Doctorate by Research; Doctorate by Coursework; Master Degree by Research; Master Degree by Coursework; Enabling Course at Doctoral and at Master Degree Level; Graduate Diploma Level and Graduate Certificate Level; Certificate Level.

<sup>10</sup> The version of the dataset used is the one updated in April 2013.

<sup>11</sup> Equally important it seems to be the presence of agreements of mutual recognition of qualifications. However, it is not a simple issue. As stated by the Department of Immigration and Border Protection of the Australian Government, ‘in Australia there is no single authority that assesses or recognizes all overseas qualifications. Many professional, Australian states’ government and other organizations are involved, depending on the type of qualification or occupation and whether the assessment is for the purpose of migration or employment in a particular state or territory of Australia’ (For more information, see the web page of the Department: <http://www.immi.gov.au/asri/background.htm>, last consulted 4 June, 2013). Australia signed some agreements to ease the procedure of recognition of qualification with some countries. All the agreements of this kind, however, have been signed by Australian in a period previous to 2003, the year of begin of my analyses. Thus, their effect is constant over the whole period considered. Origin countries’ fixed effects controls for this.

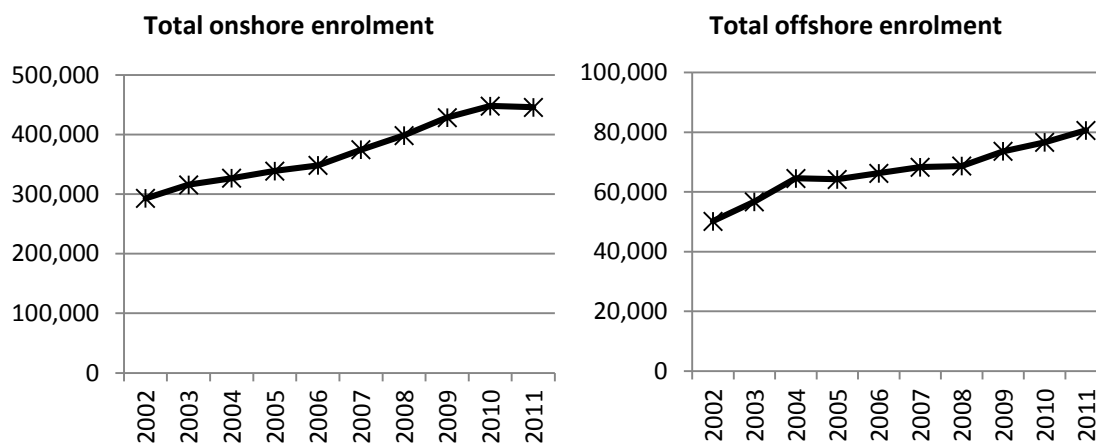
## 8 Results

### 8.1 Descriptive Evidence

The annual flow of skilled migrants to Australia has grown substantially in recent years. The total number of skilled visas granted (both offshore and onshore) has nearly doubled from 2002/2003 to 2011/2012. The inflows of skilled migrants having GMS visas, Employer Sponsored and Business Skilled visa from the top ten source countries constituted 78.38%, 74.95% and 90.90% respectively of the total inflows in 2010/2011, showing an extremely high degree of concentration towards the major countries of origin.

If we consider only skilled visas granted offshore, the UK has consistently sent the most skilled migrants to Australia each year between 2002 and 2011. The majority of countries are then Asian. In 10 years, only 16 countries are present in the top-ten list, suggesting a high impact of time-invariant characteristics in shaping skilled migration flows. This confirms that an analysis on changes within countries is more indicated than an analysis of differences between countries.

**Figure 3: Enrolment in Australian higher education**



Note: Excludes enrolment of students born in Australia.

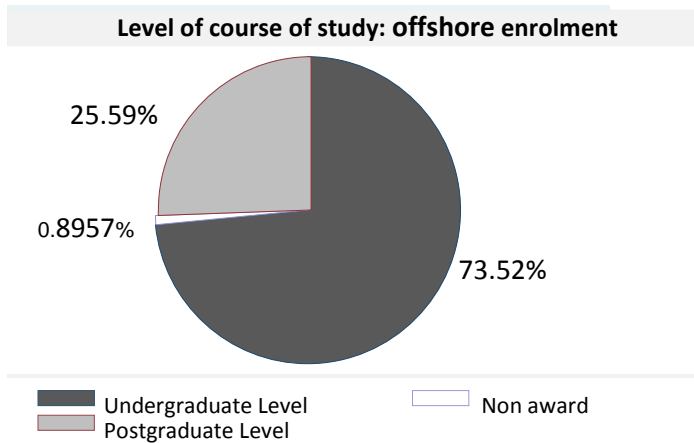
Source: Self elaboration based on Selected Higher Education Statistics, Australia Department of Industry, Innovation, Science, Research and Tertiary Education.

For descriptive purposes, checking if the increase in offshore enrolment corresponds to a decrease in onshore enrolment is noteworthy. In fact, if the people who attend offshore higher education are the same ones who would emigrate to study directly in Australia, an augmentation of offshore enrolment has to correspond broadly to a decrease in onshore enrolment. However as Figure 3 shows, in the period considered, both offshore and onshore enrolment in Australian institutions augmented. This suggests that TNE are enlarging enrolment and that the people who enrol offshore are different from people who normally migrate to study in Australia.

In 2011 there were 332,577 international students in Australian higher education institutions. Of these, 80,962 were enrolled offshore. This represented 24.2% of all higher education international students. In 2011, the majority of students enrolled in Australian higher education studied at the

undergraduate level, particularly if enrolled offshore (more than 70%, as shown in Figure 4).<sup>12</sup> Actually, in 2011, the majority of offshore students were aged between 19 and 22, whereas onshore international students were slightly older.

**Figure 4: Level of course of study in Australian higher education institution onshore and offshore (2002-2011)**



Source: Self elaboration based on Selected Higher Education Statistics, Australia Department of Industry, Innovation, Science, Research and Tertiary Education.

Figure 5 shows the geographical distribution of offshore enrolment in Australia higher education in 2002 by country of birth. Students enrolled in Australian TNE in that year are mainly Asiatic students, probably mostly enrolled directly in their countries of origin. The total enrolment in Australian TNE augmented from 50,428 enrolments in 2002 to 80,962 in 2011.

**Figure 5: Total enrolment in Australian TNE, 2002**



<sup>12</sup> See the research Snapshot “Transnational education in the higher education sector” under <http://www.aei.gov.au/research/Research-Snapshots/Pages/default.aspx> (August 2012). Last reviewed 4 March, 2013.

Source: Self elaboration based on Selected Higher Education Statistics, Australia Department of Industry, Innovation, Science, Research and Tertiary Education.

Figure 6 shows the geographical distribution of offshore enrolment in Australia higher education by country of birth in 2011. Asia remains the continent with the most enrolment by country of birth, but the number of students from Africa, Middle East and North America increased. Comparing this map with that for 2002, it is possible to remark how the number of countries with more than 1000 students enrolled offshore in Australian higher education considerably increased and the origin composition of students enrolled became more varied in the period considered. This might reflect the enlargement of the presence of Australian TNE worldwide, or perhaps the number of students coming from countries where no Australian TNE is available is also growing. Considering the total period observed, only 14.82% of the observations of the total sample concerns countries that offered any Australian TNE, but in 76.26% of observation there were some ( $\neq 0$ ) enrolments in Australian higher education offshore. This suggests that enrolment does not concern exclusively people coming from countries where Australian higher education is offered.

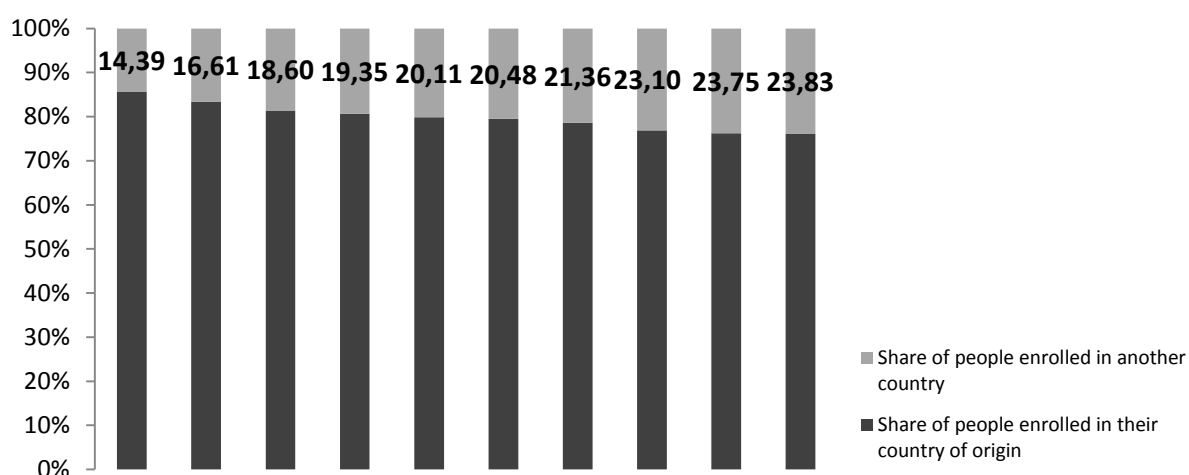
**Figure 6: Total enrolment in Australian TNE, 2011**



Source: Self elaboration based on on Selected Higher Education Statistics, Australia Department of Industry, Innovation, Science, Research and Tertiary Education.

If the majority of people usually enrol in its countries of origin, the share of people enrolled in a country different to its own country of origin is increasing (Figure 7). In this sense, TNE seems to entail new patterns of student mobility towards countries where the opportunity to study TNE is available. TNE can actually constitute a less costly type of student migration for people who do not have the possibility to study directly in Australia.

**Figure 7: Share of people enrolled in country different to its own country of origin, 2002-2011**



Source: Self elaboration based on Selected Higher Education Statistics, Australia Department of Industry, Innovation, Science, Research and Tertiary Education.

The descriptive statistics of all the variables included in the analyses is provided in appendix.

## 8.2 Results

Table 1 reports the results of the PPML estimations. Columns (1) and (2) reports the results obtained with the model with the introduction of one lagged value of the independent variable (total enrolment in Australian TNE), whereas columns (3) and (4) present the ones obtained with the introduction in the model of two lagged value of it. Columns (2) and (4) show the results of the augmented version of the equations estimated respectively in column (1) and (2), adding a dummy variable controlling for the presence of bilateral agreement.

**Table 1: Poisson Pseudo-Maximum Likelihood Regressions**

	(1)	(2)	(3)	(4)
Total offshore enrolment, t-1 (log)	0.173*** (0.04)	0.156*** (0.04)	0.137* (0.06)	0.113 (0.06)
Total offshore enrolment, t-2 (log)			0.138* (0.06)	0.142* (0.06)
GDP per capita (log)	0.037 (0.18)	0.067 (0.17)	0.020 (0.16)	0.049 (0.16)
Enrolment in tertiary education (log)	0.368 (0.21)	0.425 (0.22)	0.697** (0.21)	0.774*** (0.21)
Bilateral agreement		0.330* (0.12)		0.350** (0.14)
Constant	0.120 (1.88)	-0.437 (1.87)	-1.735 (1.63)	-2.383 (1.56)

Country dummies	YES	YES	YES	YES
Time dummies	YES	YES	YES	YES
# observations	577	577	443	443
R <sup>2</sup>	0.979	0.980	0.986	0.988

Dependent variable: total skilled visas granted offshore.

Superscripts \*\*\*, \*\*, \* denote 1%, 5% and 10% significance levels respectively.

Robust Standard errors are indicated in parentheses.

The stock of students enrolled in Australian higher education offshore in  $t-1$  is found to have a positive and significant relationship (at 1% level) on the inflows of skilled migrants to Australia, confirming the main hypothesis of this paper. Although the dependent variable is here specified as the total number of skilled visas granted offshore (and not as logarithms), the coefficients of the independent variables entered in logarithms (such as the explanatory variable of my interest) can still be interpreted as elasticity.

The results show that a 10% increase in the number of enrolment in Australian TNE from individuals from  $i$  is associated with a positive increase (between 1.7% and 1.6%) in the skilled visas granted to individuals from the same country to enter Australia in the subsequent year. Regarding other variables, a growth of the GDP per capita seems to increase skilled immigration to Australia, as well as an increase in the volume of people attending tertiary education, but the coefficient here are not statistically significant.

The presence of bilateral agreements seems to be positive associated with skilled immigration with a statistically significant coefficient. The introduction of two lagged values of the independent values causes the drop of more observations for the model estimated in columns 3 and 4. Hence, the results of the different estimations (those in columns 1 and 2 with those in columns 3 and 4) are not totally comparable because they concern different subsamples. Nonetheless, even controlling for the value of the independent variable in  $t-2$  (columns 3 and 4), the association between enrolment in Australian TNE and subsequent skilled migration remains positive and statistically significant (at 10% level). Here (column 3), the results show that a 10% increase in the number of enrolment in Australian TNE from individuals from  $i$  is associated with a positive increase (of ca. 1,3%) in the skilled visas granted to individuals from the same country to enter Australia in the subsequent year.

For the sake of completeness, a log-log version of the model is also provided in Table 2. As explained above, this approach longer represented the standard way of dealing with gravity equations. Panel data regressions were run with fixed effects (FE) using as dependent variable the natural logarithm of total offshore visas granted (columns 1, 2, 3, 4) and of total offshore visas granted +1, as a common way to deal with many zero values on the dependent variable (columns 5, 6,7,8).

**Table 2: Logarithmic specification**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Total offshore enrolment, t-1 (log)	0.119* ** (0.03)	0.119* ** (0.03)	0.128* * (0.04)	0.126* * (0.04)	0.130** * (0.04)	0.131** * (0.04)	0.131**  (0.05)	0.131**  (0.05)
Total offshore enrolment, t-2 (log)			0.004 (0.04)	0.003 (0.04)			0.050 (0.04)	0.050 (0.04)
GDP per capita (log)	-0.132 (0.16)	-0.131 (0.16)	0.020 (0.16)	0.049 (0.16)	0.080 (0.18)	0.084 (0.18)	0.362 (0.22)	0.360 (0.23)
Enrolment in tertiary education (log)	0.193 (0.12)	0.194 (0.12)	0.120 (0.18)	0.098 (0.18)	0.172 (0.12)	0.174 (0.12)	0.180 (0.18)	0.177 (0.19)
Bilateral agreement		0.008 (0.11)		-0.069 (0.13)		0.019 (0.11)		-0.010 (0.13)
Constant	2.571 (1.39)	2.553 (1.41)	0.906 (1.88)	1.181 (1.97)	-2.174 (2.04)	-2.227 (2.07)	-0.937 (3.10)	-0.867 (3.26)
Country dummies	YES	YES	YES	YES	YES	YES	YES	YES
Time dummies	YES	YES	YES	YES	YES	YES	YES	YES
# observations	543	543	419	419	647	647	482	482
R <sup>2</sup>	0.973	0.973	0.977	0.977	0.969	0.969	0.973	0.973

Dependent variable (columns 1, 2, 3, 4): log of total skilled visas granted offshore.

Dependent variable (columns 5, 6, 7, 8): log of total skilled visas granted offshore + 1.

Superscripts \*\*\*, \*\*, \* denote 1%, 5% and 10% significance levels respectively.

Robust Standard errors are indicated in parentheses.

The results obtained for the explanatory variable of interest are quite robust through the different forms of estimations. They show how a 10% increase in the number of enrolment in Australian TNE from individuals from  $i$  is associated with a positive increase (here between 1.2% and 1.3%) of subsequent skilled immigration from  $i$  to Australia, confirming the results obtained with the PPML estimator (Table 1).

## 9 Conclusion

This paper is concerned with the relationship between enrolment in TNE and skilled migration. Using aggregate panel data from Australia, it looks at the possible relationship of enrolment in Australian TNE to the subsequent skilled migration to Australia. Skilled individuals were only considered people who enter Australia with at least some higher education already acquired, using as dependent variable the number of skilled visas granted offshore. This permitted the exclusion of ex-international students who stay in Australia after having completed their studies as skilled migrants changing visas type directly onshore.

Assuming that the heterogeneous component is constant over time, a panel data analysis was conducted using the fixed effects estimator (FE), controlling for both country and time fixed effects. This has allowed the exploration of the relationship between TNE and skilled migration focusing on changes within countries. The paper provides estimation results from the multiplicative specification using Poisson-Pseudo Maximum Likelihood estimator as well as from the log-log versions of the equation. The results are quite reliable and clearly show a close link between skilled immigration and offshore enrolment in Australian higher education in the previous year.

The findings suggest that countries can successfully use the provision of higher education offshore to enlarge skilled migrant recruitment. Nonetheless, the study of only one case as a destination country do not allow for generalisations. Furthermore, a macro-level analysis merely identifies an association and enables speculation about the possible mechanisms that explain it. Survey-based micro-level information on people attending these kinds of offshore higher education institutions and programmes would be useful to compare offshore students with internationally mobile students who emigrate to study directly onshore. This would permit more accurate verification if, as supposed in this paper, developed countries' higher education institutions are reaching other types of clientele through TNE. More emphasis should then be given to the dynamics of student mobility decision-making: it is clear that enrolment in TNE often implies new patterns of student migration to the countries where the opportunity of TNE is available.

The quality of the Australian data allowed skilled migration to be measured in a very accurate way by excluding migrants' children and ex-international students who changed status to skilled migrants directly after completing their degree from the estimations. Moreover, compared with census information, normally used in research on skilled migration, data on visas granted assured more certainty regarding the year of entry of the individual counted. The Australian case is furthermore a remarkable case because of its interest in recruiting skilled migrants together with the strong international reputation of its higher education system. The use of panel data allowed controlling for unobserved heterogeneity permitting an accurate analysis of changes within countries.

This paper can be considered a first step in the exploration of an issue of particular importance for both developed and developing countries. The introduction of an explanatory variable measuring enrolment in TNE as a possible determinant of skilled migration constitutes is unique to this paper and will hopefully inspire future research and the gathering of improved data on this issue.



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# 11 Appendix

## 11.1 List of variables

Variable	Source	Definition
Total offshore skilled visa (excluding Business Skilled & Distinguished Talent)	Australian Department of Immigration and Citizenship, December 2012	Total offshore visas granted through the skilled migration stream (Skilled Independent, Employer Sponsored, State Sponsored, Skilled Australian Sponsored) by country of citizenship. It excludes Business Skilled and Distinguished Talent Visas)
Total offshore enrolment	Selected Higher Education Statistics, Department of Industry, Innovation, Science, Research and Tertiary Education (Australia)	Total number of students enrolled in Australian higher education institutions and/or programs offshore by country of birth, excluding first-year students, in t-1 and in t-2.
GDP per capita	World Bank World Development Indicators. Name of the variable in the origin dataset: GDP per capita.	Gross domestic product divided by midyear population. Data are in constant U.S. dollars.
Enrolment in tertiary education	UNESCO/UIS	Stock of people enrolled in total tertiary education (public and private).
Stock of educated people	Barro and Lee Database (Release 2013)	Stock of educated people aged 15 and over. The dataset offers information on the rate of tertiary educated people/population for the years 2000, 2005 and 2010. The missing values are linearly interpolated.
Bilateral agreement	Australian Treaties Database (ATD) of the Department of Foreign Affairs and Trade of the Australian Government	Dummy variable = 1 if there is a bilateral Social Security Agreement between the country of origin and Australia.

## 11.2 Descriptive Statistics

Variable	Min.	Max	Mean	Std. (overall)	Dev.	N. Obs
Total offshore skilled visa	0	19934	211.0314	1163.696		2450
Total offshore enrolment, t-1	0	11835	153.0735	961.8854		2205
Total offshore enrolment, t-2	0	11316	149.2418	946.3434		1960
GDP per capita	104.8117	186242.9	12447.78	20107.77		1918
Stock of educated people	403.84	6.52e+07	2232709	7069259		1287
Enrolment in tertiary education	2	3.13e+07	1015086	3035602		1250
Log of total offshore skilled visa	1.098612	9.900182	3.674214	2.009216		1250
Log of total offshore skilled visa +1	0	9.900232	1.915321	2.330401		2450
Log of total offshore enrolment, t-1	0	9.378817	2.783036	2.008		1076
Log of total offshore enrolment, t-2	0	9.333973	2.755733	2.001477		947
Log of GDP per capita	4.652165	12.13481	8.254849	1.651877		1918
Log of stock of educated people	6.001019	17.99352	12.50358	2.155857		1287
Log of enrolment in tertiary education	6931472	17.2594	11.72327	2.427869		1250
Bilateral agreement	0	1	0469388	2115509		2450

## 11.3 Alternative Estimations

**Figure A: Alternative estimations (with stock of educated people)**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Total offshore enrolment, t-1 (log)	0.095 (0.05)	0.086 (0.05)	0.027 (0.06)	0.016 (0.06)	0.152*** (0.03)	0.154*** (0.03)	0.121** (0.04)	0.120** (0.04)	0.152*** (0.03)	0.153*** (0.03)	0.130** (0.04)	0.129** (0.04)
Total offshore enrolment, t-2 (log)			0.126 (0.07)	0.126 (0.07)			0.032 (0.04)	0.031 (0.04)			0.066 (0.04)	0.066 (0.04)
GDP per capita (log)	0.423* (0.19)	0.451* (0.19)	0.554*** (0.18)	0.557*** (0.17)	0.267 (0.15)	0.279 (0.15)	0.507** (0.17)	0.498** (0.18)	0.328* (0.16)	0.338* (0.16)	0.552** (0.19)	0.547** (0.20)
Stock of educated people (log)	-0.323 (0.41)	-0.306 (0.41)	-0.643 (0.40)	-0.610 (0.41)	0.262 (0.16)	0.273 (0.16)	0.014 (0.18)	0.005 (0.18)	0.333 (0.19)	0.345 (0.19)	0.381 (0.26)	0.376 (0.27)
Bilateral agreement		0.253* (0.10)		0.216 (0.12)		0.080 (0.11)		-0.050 (0.12)		0.077 (0.10)		-0.031 (0.12)
Constant	6.275 (4.19)	5.939 (4.24)	8.618* (4.19)	8.165 (4.31)	-4.505* (2.15)	-4.767 (2.19)	-4.345 (2.53)	-4.163 (2.60)	-1.519 (3.48)	-1.821 (3.53)	-5.383* (2.61)	-5.292* (2.67)
Country dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Time dummies	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
# observations	663	663	516	516	626	626	490	490	734	734	559	559
R <sup>2</sup>	0.970	0.971	0.976	0.976	0.972	0.972	0.976	0.976	0.969	0.969	0.973	0.973

Type of specifications:

-Columns (1)-(4): Poisson Pseudo-Maximum Likelihood Regressions.

-Columns (5)-(12): Logarithmic specifications.

Dependent variable:

-Columns (1)-(4): Total skilled visas granted offshore.

-Columns (5)-(8): Log of total skilled visas granted offshore.

-Columns (9)-(12): Log of total skilled visas granted offshore + 1.

Superscripts \*\*\*, \*\*, \* denote 1%, 5% and 10% significance levels respectively.

Robust Standard errors are indicated in parentheses.