Brain Drain or Brain Gain? The case of Moroccan Students in France

Bouoiyour, Jamal and Miftah, Amal and Selmi, Refk

CATT, University of Pau., LEDa, University of Paris-Dauphine, ESC, Business School of Tunis

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Jamal BOUOIYOUR
CATT, University of Pau, France
Email: jamal.bouoiyour@univ-pau.fr

Amal MIFTAH

LEDa, University of Paris-Dauphine, France.
IRD, UMR225-DIAL, France.
Email: miftah_amal@yahoo.fr

Refk SELMI
ESC, Business School of Tunis, Tunisia
Email: s.refk@yahoo.fr

Abstract: Brain drain has long been an important concern particularly for a developing country like Morocco where high-skilled emigration rates are highest. The aim of this paper is to highlight the causes of migration of Moroccan students to France, to offer then some implications. To this end, we apply an ARDL Bounds testing approach and VEC Granger causality test to annual data spanning the period between 1971 and 2011. We show that the quality of higher education measured by French research & development (proxy of French institutions) seem the main determinant of student mobility. The per-capita income differential between France and Morocco also plays an important role on explaining student migration. The uncertainty about future Moroccan inflation (proxy of Moroccan institutions) encourages the departure of students abroad, while the degree of openness via trade and foreign direct investments discourage. Academic exchange agreements and the creation of research centers accredited by the two countries have been recommended to enhance the French economic development from high-skilled migrants without depriving Morocco.

Keywords: Brain drain; Brain gain; Moroccan students; France.

1. Introduction

The increasing openness of economies and the aging populations of the developing countries have put the issue of international migration in the heart of the phenomenon of globalization. This, in turn, has increased international competition of certain categories of migrants such as highly-educated and highly-skilled workers. Several industrialized countries have clearly opted for a policy of "selective migration", i.e. a migration that takes into account the economic needs of the labor market in the host country. In this vein, somel host countries have opted for bilateral agreements with the providers of labor-sending countries. Thus, several forms of recruitment increasingly targeted have emerged: highly skilled workers in high-tech sectors, health professionals, etc.

Moreover, following the remarkable rise in the demand for education and training at global level, competition in attracting foreign students has increased significantly. Some countries are better able to attract and develop the best talent through the quality of their higher education and research infrastructure. This is the case of the United States for example. But the traditional host countries of international students are no exception to this trend that has as result the departure abroad of their young talent. Some countries of student emigration have also actively sought to attract brilliant foreign students, China is among the first to engage in this battle, and recently other African countries like Morocco and South Africa[1]. At the same time, for several years now, we have observed an emergence of new emigration actors from Asia. Together, China and India provide over a quarter of international students. According to statistics provided by the OECD (2013), nearly 4.5 million students are currently enrolled at tertiary level in a country of which they are not nationals. International students are an important resource for labor migration (OECD, 2012). Indeed, one of the characteristics of international migration, besides its feminization, is the rising level of education of newcomers. Migration of foreign students can also generate significant economic benefits for the host country. According to the study of Kunin (2009), in 2008 the economic contribution of 178,227 international students in prolonged stay in Canada is estimated at $ 5.5 billion and contributed approximately $4.1 billion to Canada's GDP. According to the same source, the international student market has also generated 83,000 jobs in terms of school fees, food, transportation, housing services and other expenses. The report notes that "Canada has exported in 2008 $ 1.3 billion of international education services - considerably

[1]During the last decade, the number of foreign students enrolled in Moroccan public institutions has experienced continuous growth. It has risen from 2,508 students in the academic year 1998-1999 to 11,577 in 2010-2011 (Meyer and Laouali, 2012).

more than any other ten major categories of exports of goods to China." In addition, foreign students can strengthen research capacity in countries of destination. Some economies such as the United States have a strong need for technological innovation; its high value-added sectors which are characterized by a more innovative behavior heavily rely on these potential workforces (computers, electronics, aeronautics, etc).

Similarly, foreign students are a cultural vehicle of the destination country, which can turn in case of migrants return home, into a powerful economic factor. Once the students went home, they maintain strong ties with their former host country (imports, exports, creation of joint ventures, etc.). If the student migration has positive potential effects on host countries in general, its impacts on the countries of origin are more perverse. In most cases, these record significant losses (in terms of human capital, but also tax revenues raised from taxation of future managers for example) which could constitute a real brain drain. Without detailing the causes and the consequences of this phenomenon widely debated in a large strand of literature, or pick up on new theories of Brain drain - Brain gain, it seems interesting to elucidate understanding on the logic of migration of students with special reference to Moroccan students who go to France. Studies on student migration show that the departure and the residence of students are often motivated by complex mix of social, economic, political and cultural factors. Thus, a set of factors that can attract or repel students were identified. The pull factors dominate in particular tuition fees, conditions of living and working, career opportunities, language of study and the quality of higher education (OECD, 2013). The push factors may be divided into economic (such as the weak economic outlook), and non-economic ones (such as the respect for human rights, the democracy and the security), which usually appear as major players for those students from countries of the South.

Actually, countries receiving the most foreign students are the United States, the United Kingdom, Australia, Germany and France. In 2011-2012, France has hosted more than 284,000 foreign students most of whom are from African countries (44%). Students from Maghreb alone represent 25% of the total number of students enrolled in French higher education, among whom, Moroccans are the most represented. Their number reached 32,482 in 2011-2012 or 11% of the total student body. Several factors explain the students' choice of this destination: there are academic reasons (quality of training, value of French qualifications and reputation of institutions), but also professional reasons and other motivations rather personal and practices such as knowledge of French and education costs (Campusfrance, 2011). France has in fact been a desirable home base for North African students in general

and Moroccan students in particular for a long time. The report for the Observatory of Student Life (Coulon and Paivandi, 2003) emphasizes that the migration of North African students in France is not only the result of individual behavior, it is also intensely attributed to the general history of the Maghreb countries, their maintained links with France, and the deep of strategic development planning authority. Among the other factors that influence this migration of students, we include, for example, the national higher education policies and the allocation of grants to foreign students, administrative conditions under which migration is undertaken and the bilateral cooperation policies.

Moroccan authorities have long understood the importance of migration as a means to improve the welfare and contribute to national economic development. Thus, emigration can participate to easing of labour market pressure, to savings and to the acquisition of knowledge and know-how. Migration policies have been defined around these principles as well as maintaining close ties between migrants and their country of origin to preserve their identity in different host countries. If economic motivations have often been the foundation of the individual decision to migrate, they have also been associated with the definition of Moroccan migration policy. Sending students abroad for study is an integral part of this migration strategy (Bouoiyour, 2013).

The purpose of this paper is to determine the main reasons behind the choice of Moroccan students to France for completing their studies. This study also intends to examine the migration policies in countries of origin and destination, their logic, their evolution and their interactions. It should be noted that the studies on this matter are very scarce especially those on the North African countries, hence, the interest in our study. Our results show that the key pull factor is the quality of scientific research in France (proxy of French institutions). The wealth differential between the two countries (which reflects the standard of living) is also an important determinant of the choice of France (in the insertion perspective on the French labor market after graduation). Economic uncertainty (captured through the volatility of inflation, a proxy of Moroccan institutions) has positively impacted student migration. The degree of openness of Morocco (measured by FDI and trade) also plays a role, albeit marginally, in the departure of Moroccan students to France.

This paper is organized as follows: we propose in Section 2 a brief review literature of the determinants of student migration. Section 3 shows the evolution of Moroccan students in France since the 70s and the detailed description of the data. Section 4 presents the econometric methodology used and Section 5 describes the results. Section 6 examines the

migration policies of Morocco and France, and how to transform the brain drain into brain gain. Section 7 concludes and offers some policy recommendations.

2. Literature

Economic theory on migration has identified several factors in particular economic which would be responsible for the departure of migrants abroad as unemployment in the country of origin, poverty and the wage gap between the origin and host countries. This is the push-pull approach that unifies previous theories of migration. It has recently been adapted for the case of student mobility (Mazzarol and Soutar, 2001; McMahon, 1992; Maringe and Carter, 2007).

Beside strictly economic factors such as the level of economic wealth of the country which sends its students abroad and the degree of its participation in the global economy, many other factors can be presented as push factors such as the priority given to higher education by the developing countries. Pull factors of a host country may also be economic as economic ties between host and origin countries and the cost of education and living, but other explanatory factors of students departure exist as the language and the quality of education, the possibility of part-time work, the perspectives on the foreign labor market, the network of friends and acquaintances, and cultural and geographical proximity. Furthermore, most studies have focused on some of the factors already mentioned and have identified subsets of the most important factors "affecting" (Rosenzweig, 2006; Van Bouwel and Veugelers, 2013; McMahon, 1992).

It should be noted that many countries of origin maintain close economic, political, and cultural ties with their former colonial rulers. On their side, colonial countries such as France and the United Kingdom had a special relationship with their former colonies that included for example opportunities for study.

Several studies on the demand for international education focused on both steps of the student decision-making process and the main factors that influence this decision (Mazzarol and Soutar, 2001; Maringe and Carter, 2007). Mazzarol and Soutar (2001) emphasize that the selection of destination passes through three stages. In the first step, students decide to study abroad or to acquire an international training instead of a national training. This decision is made under the influence of push factors. In the second stage, students choose their destination country according to Pull factors that make some countries more attractive than

others. Finally, students choose the institution of higher education more attractive in terms of other type of pull factors such as the reputation of the institution, the career opportunities offered by its training and the degree of innovation.

It may be noted also that the push-pull model does not explain the personal decisions relating to study abroad since it does not take into account the individual characteristics and more subjective considerations such as individual motivation and the student's life project (Chirkov et al, 2007)[2]. Although they are closely related to the economic situation and the inequality in education between the North and the South, the determinants of international migration of students have also microeconomics, cultural and sociological aspects. In traditional research on the choice of higher education, motivation is discussed in terms of motives that lead students to undertake higher education. The weight of various reasons is different and can vary from student to student depending on his aspirations, career project, socio-cultural environment, financial constraints, etc. Recently, several studies have tried to combine the student access to the university and the choice of international migration literature (Lee, 2008).

Obviously, the demand for higher education depends on costs and future returns on investment in higher education (returns estimate with earnings). In other words, the choice of higher education is based on cost-benefit analysis of education. Thus, students will choose to attend an institution of higher education if market returns to education are more important than its total cost. In this respect, the quality of education plays a strong incentive role in the pursuit of higher studies decision. With globalization, more and more students choose to make a part or all of their education in other country because they are attracted by the quality of its higher education. Van Bouwel and Veugelers (2013) find that the quality of higher education measured by variables such as scientific publications and Shanghai Academic Ranking of World Universities will attract foreign students to Europe.

Other items relating to higher education in host countries were used like the system of bursaries (McMahon, 1992) and enrolment fee (Mazzarol and Soutar, 2001). As pointed out by several studies, the demand for higher education may be subject to the amount of tuition and mandatory fees collected for courses. Beine et al. (2013) found a positive effect of tuition

[2] Based on the theory of self-determination, Chirkov et al (2007) have studied the motivation acting the choice of Chinese students to study in Belgium and Canada. Their results support the idea that the self-determination of students would be more beneficial to their adaptation to the new cultural environment. Their findings also show that the initial goals of study abroad are closely related to better career opportunities.

fees on the foreign student's choice of their host country. Two factors help explain this result. On the one hand, tuition fees may exert a signalling effect: high costs might reflect a high quality of education. On the other hand, there may be a reverse causality: the prestigious universities in host countries tend to increase their fees. Moreover, as highlighted in the recent OECD report, in some countries such as Australia, the United States or the United Kingdom, the highest level of tuition fees is not necessarily an obstacle to international student mobility. Students' decision to study abroad also takes into account the additional costs of international mobility as living expenses, travel costs but also the possibility for future students to find part time jobs (Mazzarol and Soutar, 2001).

Student migration does not depend only on the personal choice of people living in developing countries, but also on the policies of host countries. Haupt et al. (2010) have examined the impact of the international mobility of students on the education policy of the host country. They specifically analyze the implications of an increase in the probability that a student settles permanently in the host country after graduation. They think that a higher probability of permanent migration of students grows host countries to improve the quality of their higher education since thanks to the permanent residence of foreign students, their human capital has significant positive externalities. Kota and Sparber (2013) have studied the impact of immigration policy of the United States on the international attractiveness of American universities. They find that the restrictive policy on skilled immigration adopted in the mid-2000s has resulted in a decline in the number of foreign students and in the quality of students interested in American higher education system. More specifically, the authors believe that this restrictive immigration policy has remarkably discouraged good international students to pursue their higher studies in the USA. This result confirms the idea that students make the decision to continue studying and obtaining foreign degree, based on the probability of finding a job in their home country after graduation, in order to gain access to the labour market opportunities in the host country.

3. Migration of Moroccan students: Stylized Facts [3]

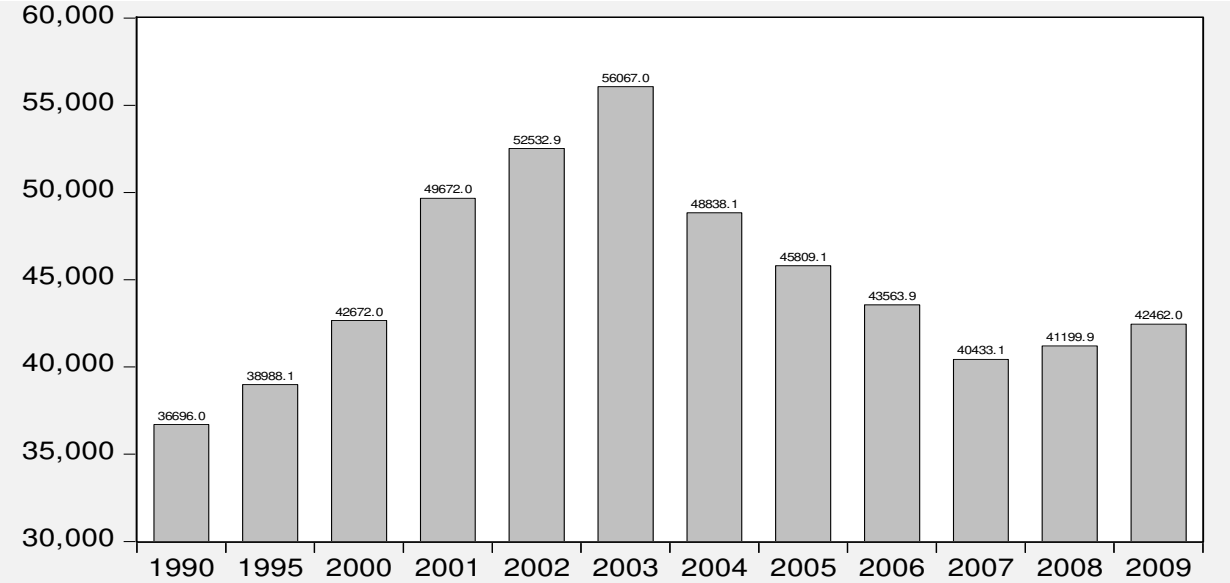
3.1. Moroccan students in the world: an erratic evolution

Before addressing the student immigration in France, we will initially look at the evolution of Moroccan students in the world based on data provided by UNESCO. As can be

[3] This section draws heavily on the Bouoiyour (2013) report.

seen in Figure-1, there are two phases. The first ascending from 1990 to 2003 and the second goes down from 2004 to 2007. In the last two years (2008 and 2009), migration increased without reaching the level of 2006. This variability is mainly due to the erratic changes that French' policies on the reception of student migrant have generated. If France remains the most preferred destination for Moroccan students, other frontiers are opening up like Germany, Belgium, Spain, Italy and North America (United States and Canada). In 2009, their total number reached 10,000 in Germany, about 2,500 in Spain and less than 2,500 in Canada and Italy (CampusFrance, 2011)[4]. This diversification of destinations shows that the new generation of Moroccan students is different from the first one. This may probably reflect changes in Moroccan society accompanied by favourable economic conditions. In fact, the standard of living and the overall education level have increased with economic growth allowing more diversified and less concentrated openness to France (Balac, 2008).

Figure 1. Number of Moroccan students in the world



Sources: UNESCO and Balac (2008).

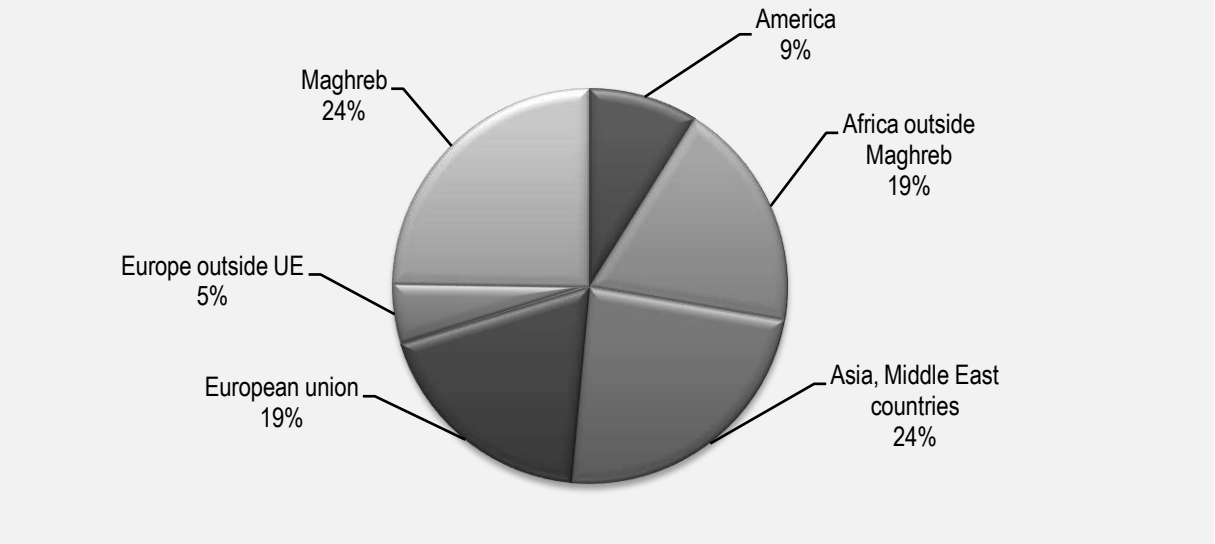
3.2. France remains a welcoming land for Moroccan students.

In 2011-2012, France has hosted more than 284,000 foreign students most of whom are African (44%), students from Maghreb alone represent 25% of the total number of

[4] The data of Canada are for 2007, those of Italy are for 2008, the most recent data are missing.

students enrolled in French higher education (Figure-2). Among these students, Moroccans are the most represented.

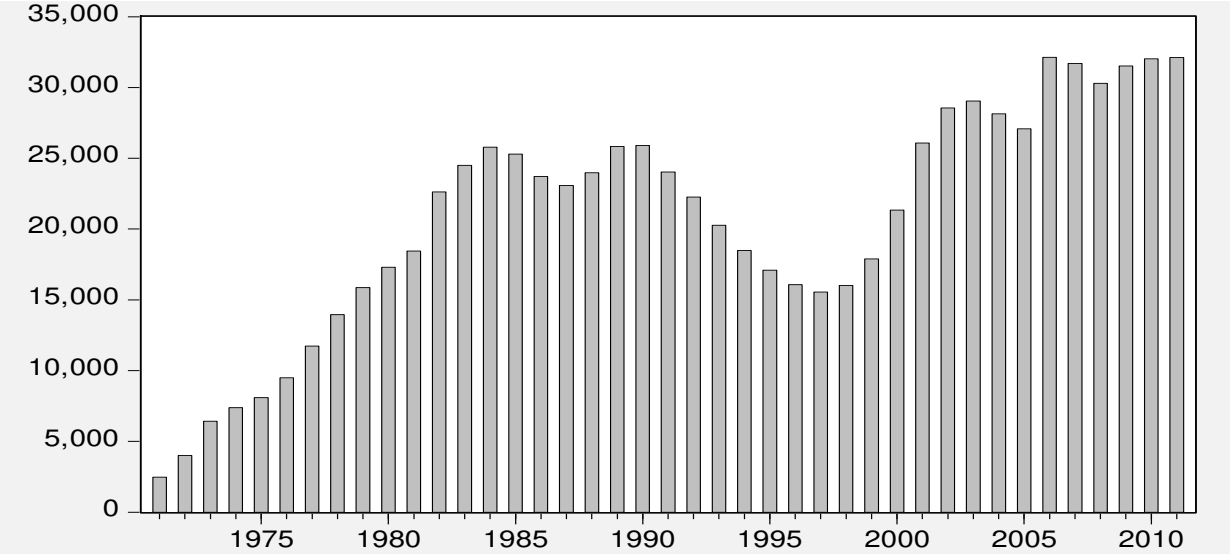
Figure 2. Distribution of foreign students in higher education by origin 2011-2012 in France (overseas departments, public + private)



Sources: MESR-DGESIP-DGRI-SIES/ Information System SIES, investigations by the SIES on engineering schools and educational institutions.

Their number reached 32,482 in 2011-2012; the percentage rise is about 11.83 since 2003-2004 (Figure-3). This increase is less strong than that exercised between 1998-1999 and 2003-2004, which amounts 81.2%. The essential observation that can be drawn from Figure-3 is the strong oscillation in the number of Moroccan students in France. ". It is due to at least two factors; one seems exogenous, while the other one is endogenous. The first reflects the changes in the French institutional context, which is characterized by a tightening of entry requirements for foreign students (Bonnet circular in 1980, Joxe circular in 1985 and Pasqua laws in 1993, for example). The recovery period (second half of the 1990s) represents a shift in the position of the French government on the issue of foreign students. The second factor is related to the capacity of Moroccan migrants to overcome the institutional constraints. As mentioned previously, the emergence of new attractive destinations (Germany and Spain, for example) can also explain these sharp variations.

Figure 3. Number of Moroccan students in France



Source: MEN-DEP

Table-1 shows the evolution of the number of North African students in France. Morocco remains far ahead of Algeria and Tunisia, but we find the same variability in these two countries compared that found in Moroccan case. It seems also important to note that, in recent years, Chinese students have become the second largest population of international students, just behind the Moroccans. Their number has increased continuously from almost 2111 in 2000 to 29,000 in 2010.

Table 1. Changes in the number of Maghrebian students in France + DOM

	1984-1985	1994-1995	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2008	2010-2011
Morocco	25778	18488	16030	17899	21343	26076	28563	29044	30284	32020
Algeria	10 961	20215	13427	12535	12005	13602	17065	21672	20789	22818
Tunisia	8 028	5 461	5079	5676	6346	7251	8253	9130	12821	13645
Total	133848	134943	122190	129533	141700	159562	180494	200723	264352	284 659

Sources: MESR-DGESIP-DGRI-SIES.

3.3. Well targeted specialties and low return rate

It should be noted that Moroccan students in France choose more scientific and sportive or economic specialities for respective percentages 33% and 30.3%. For schools, it is the engineering specialities of outside university that attract the most.

Table-2 highlights the fact that the majority of Moroccan students follow Bachelor and Master Courses (43% and 50%) and only 7% following PhD courses. They are therefore less likely to receive research training. It is clearly observable that the French universities attract less Moroccan students than the previous years. Their number fell by 4.1 % between 2002 (i.e. 25,189) and 2006, by about 9.5 % between 2006 and 2009, and finally by 16.83 % between 2009 and 2011 (i.e. 18,190). At the same time, they are more enrolled in engineering (13 %) and business (9%) schools. It should be noted here that these schools are prestigious and very selective. The institutions that offer this training kinds are more concerned with the reception and the installation of foreign students in France (better reception, language courses, sponsorship for international foreign students, etc[5]).

Table 2. The number of Moroccan students by level in the French universities

	2006/2007	2007/2008	2008/2009	2009/2010	Evolution (in %)	% of total
Level L	11185	9647	9708	9477	-15,3	43
Level M	11095	11078	10459	10984	-1	50
Level D	1880	1686	1543	1412	-24,9	7
Total	24160	22411	21710	21873	-9,5	100

Source: Campusfrance. L : Licence (Bachelor), M : Master, D : Doctorat.

3.4. Continued demand of Moroccan students to pursue higher studies in France versus volatile French migration policy

Based on Balac (2008)'s study, the evolution depicted above of the number of migrant students and its strong volatility can have at least three main explanations based in the demand and supply of education in Morocco:

[5] See CampusFrance, File - Foreign students: the reception costs by AEGIS available on the following address: http://www.tac.org/doc/Etudiants% 20% C3% A9trangers.doc

(i) The tremendous increase in the Moroccan population as a whole since the country's independence. Morocco has experienced a demographic transition recently. This increase in population has resulted in an increase in the number of students attending higher education. This goes hand in hand with the increase of migrant students.

(ii) Faced with this dramatic increase in students' number, the Moroccan government has increased the number of public universities and academic institutions. But despite the apparent efforts, the supply of higher education was unable to cope with the explosion in the number of students; encouraging thus the implementation of private educational institutions, that continued to increase remarkably. These private institutions have grown in recent years with approval from several universities[6].

(iii) As mentioned above, the increase of student number wishing pursue their higher studies accompanied with the weaker reception structures in Morocco would ensure that going abroad to study was an ultimate choice for Moroccan students. But the migration to France seems sometimes as "the Way of the Cross". Because, if after the independence of Morocco, the cooperation agreements between France and Morocco have enabled many students to complete their training in France by obtaining grants either from Moroccan or French governments, the 70s were marked by the "massification" of migration to France, following the spectacular development of the higher education demand in both Morocco and France but also by the establishment of a selective migration policy, especially towards students from the former colonies, accused of lowering the quality of French higher education. This policy continued during the period between 1984 and 1997 to the extent that the proportion of foreign students in the total increased from 14.1% to 8.5% for the same period. The number of Moroccan students in France has literally collapsed from 25,778 to 15,546 between 1984 and 1997. In 1998, the French authorities have changed their minds considering that it is of utmost importance to attract foreign talents. This policy has resulted in an increase in the number of foreign students including Moroccan students. In 2002, the government once again changed his tune; the number of student visas dropped leading to a decrease in the number of Moroccan students in France. This policy sometimes "generous",

[6] Private University of Rabat, Mundiapolis in Casablanca and others in Marrakech and Agadir. All the private universities are not yet approved, but the process is ongoing. Disciplines within these universities, however, are approved.

sometimes "parsimonious" shows the inconsistency of the general migration policies related particularly to students. The administration in charge of migration policies powerfully shapes the migration flows. This is valuable for students and graduates who wish to migrate to France, but what about non-qualified or unskilled population!

4. Methodology

This study attempts to assess the effects of some macroeconomic variables on the flow of migrant students from Morocco. Before presenting the methodology, we first begin by describing the variables and data used for the empirical analysis.

4.1. The choice of variables

(i) The search of a better economic situation and a best income sources is one of the main variables influencing international mobility decisions (OECD, 2008). This is measured -in a general context of international migration- by the wealth difference between the host country and the country of origin. In the case of Morocco, we believe that this wealth difference is a relevant variable for the international student mobility, to the extent that most of Moroccan students perusing their higher studies in France do not return to Morocco after the graduation. The only statistics available on this subject is that of MIREM study, which states that only 12.5% of students return to Morocco after the completion of their degrees[7]. Given the great wage and unemployment gaps between Morocco and France which can explain the size of international migration (the neoclassical theory of labour migration), we use the per-capita income differential between France and Morocco, as a first determinant variable of international student mobility. The France's per capita income is six times that of Morocco (Alonso, 2011). Given these concerns, we expect a positive relationship between the GDP differential and the student migration flows.

(ii) The attractiveness of France - the host country - can be measured by several variables such as quality of teaching and research, reputation of universities and dynamic tie between training and labor market. We choose here the research and development (*R&D*) expenditures (relative to GDP) as an effective proxy that summarizes all the

[7] 32.2% and 29.6% for the Algerian and Tunisian students return to their origin countries.

above variables. We assume that this variable reflects the quality of institutions in France. Intuition suggests a positive relationship between *R & D* and student mobility.

(iii) Economic stability is an important indicator that determines the ability of each country to have an efficient monetary policy. Economic agents, either internal or external, prefer to operate in a stable and peaceful environment. Hence, one of the main determinants that can reflects the degree of effectiveness of the followed monetary policy is the uncertainty about future inflation (Ball, 1992). Keeping the rate of inflation low and stable also offers an indicator of "good" governance. In other words, the appropriate governance framework enables monetary policy to have a stable inflation rate. Of course, a sizeable rise of inflation sustains the migration costs that domestic students face. In our study, we use the standard deviation of inflation (Consumer Price Index, CPI) as volatility proxy. This variable can reflect the quality of institutions in Morocco. We expect a positive impact of this variable student migration[8].

(iv) Foreign Direct Investment (*FDI*) is an engine of economic growth in developing countries. *FDI* inflows stimulate capital accumulation by adding to domestic savings. They also improve resource allocation, stimulate job creation, enhance industrialization, increase international transactions and technology spillovers, improve human capital and reduce local capital costs (Gorg and Greenaway, 2004; De Mello, 1999). The item of interest here is the impact of foreign investments on job creation. A substantial part of *FDI* destined to Morocco aimed at deriving full benefit from cheap labor force of the country. This country is also able to attract multinational companies, which need to hire managers with intermediate and higher levels. In this case, FDI may negatively impact our variable of interest i.e, the international mobility of Moroccan students. However, this factor can be a sign of the involvement of the country of origin in economic globalization and thus this country is more likely to encourage student to study abroad. The sign of the relationship can be positive or negative, depending on the short and long term.

(v) The degree of trade openness is an important variable explaining the economic dynamics of a country. It is clear that a country with a greater degree of trade openness, and thus more directed towards the external market, would need well-trained young professionals. It is so, because of the complexity of international

[8] Given the lack of data over a long period of institutional variables, we assume that the volatility of inflation as a proxy of institutions in Morocco.

markets (compliance, international competition, etc.). Therefore, in the short term a significant openness could increase the investment in education and the young individuals can migrate to acquire high quality of education, while in the long term, those with higher abilities, will be those who decide to return to their countries of origin. As for FDI, the sign of the relationship is ambiguous.

(vi) Institutional changes relating to the limitation on the number of entries students in France were considered (dummy variable). We can thus imagine that by implementing special migration policies aimed at international students, government of the host country can attract only a specific international students from some countries (like India and China in the case of France in the past decade).

(vii) After the late 70s, economic adjustments are pushing Moroccan workers to go abroad but also students. In fact, the Structural Adjustment Program (1983) has involved substantial cuts in government spending on social services (the subsidy to the basic necessities for example) and on public employment and investment (restrictive education reforms).

4.2. Data

Our investigation duly acknowledges the key determinants of the number of migrant students (*MSTUD*), mentioned in the economic literature, such as the GDP differential between Morocco and France (*GDPDIFF*) determined by the gross domestic product converted to international dollars using purchasing power parity rates, the research and development expenditure as percentage of GDP (*R&D*) that covers basic research, applied research, and experimental development, standard deviation of consumer price index as measure of inflation volatility (*INFV*), foreign direct investment in percentage of GDP denoted by (*FDI*), the openness (*OPEN*) measured by the sum of exports and imports as a percentage of GDP, by incorporating a dummy variable presenting the institutional changes relating to the limitation on the number of entries students in France, which amounts 1 between 1990 and 1997 and 0 otherwise (*INST*) in function one ($F1_{MSTUD}$) and a dummy variable the structural adjustment program, which amounts 0 before 1983 and 1 otherwise (*PAS*) in function two ($F2_{MSTUD}$). This study uses annual data spanning the period between 1971 and 2011. All data (except *MSTUD*) are obtained from the World Development Indicators database and were transformed into logarithmic series. The number of migrant students concerns only legal migration reported by France national agencies in charge of collecting migration data. The general models are:

$$MSTUD_t = a_0 + a_1 GDPDIFF_t + a_2 R\&D_t + a_3 INFV_t + a_4 FDI_t + a_5 OPEN_t + a_6 INST + \varepsilon_t \quad (1)$$

$$MSTUD_t = a'_0 + a'_1 GDPDIFF_t + a'_2 R\&D_t + a'_3 INFV_t + a'_4 FDI_t + a'_5 OPEN_t + a'_6 PAS + \varepsilon'_t \quad (2)$$

Where ε and ε' are the error terms with normal distribution, zero mean and finite variance.
The GDP differential affects positively the number of migrant students and the migrants from countries with lower migration costs are more sensitive to *GDPDIFF*. We expect therefore $a_1, \alpha_1 ' > 0$. *R&D* reflects the quality of research and studies in France, as it reflects more generally the quality of institutions. This creates new migration flows. For example, Moroccan students are an increasing part of graduate enrolments in France. As well as generally becoming more open to immigration, France encourages the highly skilled students to stay, either temporarily or permanently. We expect $a_2, \alpha_2 ' > 0$. Obviously, economic agents prefer to operate in a stable environment that may have positive effects on the whole economy. Nevertheless, an instable economy through uncertainty about future consumer prices lead to a rise of migration flows. We expect $a_3, \alpha_3 ' > 0$. The degree of openness of Morocco (measured by *FDI* and trade openness as the sum of imports and exports in percentage of GDP) allow evoking the economic growth and the technological development in the respective economy through externalities (Knell and Radosevic, 2000). Thereby, the contacts between foreign and domestic firms that can lead to technological transfers and to the high skilled migration in order to enhance the competition on the market. But these relationships can be ambiguous, so it is expected that $a_4, \alpha_4 ' > 0$ or < 0 and $a_5, \alpha_5 ' > 0$ or < 0. The implemented reforms aimed to limit the number of migrant students to France between 1990 and 1997 sustain the decrease in Moroccan student flows and therefore we expect a negative coefficient ($a_6 < 0$). By achieving the Structural Adjustment Program (*PAS*) in 1983, the state reduces its budget and investment leading therefore to less space in universities. This implies that students will go massively abroad and thus we expect a positive connection between *PAS* and students migration ($a_6 ' > 0$).

4.3. The ARDL Bounds Testing Method

The ARDL bounds testing approach has been introduced by Pesaran and Shin (1999) and extended by Pesaran et al. (2001). It deals with single cointegration. This method allows us to assess simultaneously the short-run and the long-run relationship between the student migrant flows from Morocco to France, the per capita income differential between the country

of origin (Morocco) and the foreign country (France), the economic uncertainty through the inflation volatility, the degree of openness through the foreign direct investment and international trade (both imports and exports) and the research and development expenditure, by incorporating two dummy variables that may play important role in explaining the student flows (they correspond respectively to the implementation of reforms in order to lessen the number of foreign students in France including Moroccan migrants and to the structural adjustment program). The ARDL model takes into account a one-period lagged error correction term, which does not have restricted error corrections. The ARDL to cointegration method involves estimating the following Unrestricted Error Correction Model (UECM) based on the equations (1) and (2):

$$DMSTUD_t = b_0 + \sum_{i=1}^{n} b_{1i} DMSTUD_{t-1} + \sum_{i=0}^{m} b_{2i} DGDPDIFF_{t-1} + \sum_{i=0}^{l} b_{3i} DR\,\&\,D_{t-1} + \sum_{i=0}^{h} b_{4i} DINFV_{t-1} + \sum_{i=0}^{v} b_{5i} DFDI_{t-1} + \sum_{i=0}^{l} b_{6i} OPEN$$
$$+ b_1 MSTUD_{t-1} + b_2 GDPDIFF_{t-1} + b_3 R\,\&\,D_{t-1} + b_4 INFV_{t-1} + b_5 FDI_{t-1} + b_6 INST + \xi_t \qquad (3)$$

$$DMSTUD_t = b_0' + \sum_{i=1}^{n} b_{1i}' DMSTUD_{t-1} + \sum_{i=0}^{m} b_{2i}' DGDPDIFF_{t-1} + \sum_{i=0}^{l} b_{3i}' DR\,\&\,D_{t-1} + \sum_{i=0}^{h} b_{4i}' DINFV_{t-1} + \sum_{i=0}^{v} b_{5i}' DFDI_{t-1} + \sum_{i=0}^{l} b_{6i}' OPEN$$
$$+ b_1' MSTUD_{t-1} + b_2' GDPDIFF_{t-1} + b_3' R\,\&\,D_{t-1} + b_4' INFV_{t-1} + b_5' FDI_{t-1} + b_6' PAS + \xi_t' \qquad (4)$$

Where D denotes the first difference operator; ξ and ξ' are the usual white noise residuals. The estimated ARDL test statistics are compared to two asymptotic critical values tabulated in Pesaran et al. (2001, pp. 300-304) rather than the conventional critical values. If the test statistic is above the upper critical value, the null hypothesis of no long-run relationship can be rejected regardless of the orders of integration of the underlying time series. Conversely, if the test statistic falls below the lower critical value. However, if the test statistic falls between these two bounds, the obtained finding is considered as inconclusive.

4.4. VEC Granger causality test

Basically, in the context of ARDL approach to cointegration, the variables are mixed in terms of order integration (integrated in order 0 and 1). This prompts of testing for Granger non-causality test (Toda and Yamamoto, 1995). According to Lütkepohl (2006), this test can be properly applied when the considered time series seem possibly cointegrated. More precisely, the fact that the concerned variables are cointegrated using the F-statistic obtained from Wald test compared with those proposed by Pesaran et al. (2001) as lower and upper

bounds, highlights the need to use the Granger-non causality test. This latter has as main objective to test zero restrictions on the parameters in the VAR or VECM models.

Based on Toda-Yamamoto (1995), we should initially refer to the standard definition of Granger causality (Granger, 1969) whereby "*X* is said to Granger-cause *Y* if *Y* can be better predicted using the histories of both *X* and *Y* than it can by using the history of *Y* alone." The absence of Granger causality is tested by estimating the following model:

$$DMSTUD_t = \kappa_0 + \kappa_1 DMSTUD_{t-1} + \kappa_2 DX_{t-1} + \mu_t \quad (5)$$

Where *X* denotes the logarithm of explanatory variables in question, which are respectively *GDPDIFF, R&D, INFV, FDI, OPEN*; μ_t is the error term.

Next, we test the hypothesis $H_0: \kappa_0 = \kappa_1$ against H_1 which is a test that all the above time series do not Granger cause *MSTUD*. The reverse link is not assessed here because there is no sense on the issue of brain and drain of the unidirectional nexus running from the number of migrant students to the GDP differential, the inflation uncertainty, the research an economic development, the foreign direct investments and the degree of openness.

5. Main findings

5.1. ARDL Bounding test findings

To evaluate whether there is a significant long-run relationship between the number of Moroccan migrant students in France and the explanatory variables under consideration including the GDP differential, the *R&D* in France, the inflation volatility in Morocco, , the foreign direct investment in Morocco, the degree of openness in Morocco and a dummy variable presenting restrictive reforms implemented by France to mitigate the student flows, we start by assessing the validity of estimated coefficients. It is initially well depicted from Table-3 a great variability of data (standard deviation), which highlights the need to use robust models. The coefficient of kurtosis appears inferior to 3 for *GDPDIFF*, *INFV* and *R&D* and superior to 3 for the rest of series under consideration, implying that the distribution is less flattened than the Gaussian distribution for the first time series and more flattened that normal distribution for the last ones. The Skewness coefficient is negative for all the variables, indicating that the symmetrical distribution is plausible. The Jarque- Bera test revealed high and significant values for *MSTUD*, *R&D* and *FDI*, leading to accept the

assumption of normality, while the statistics associated to *GDPDIFF, INFV* and *OPEN* seem insignificant.

Table 3. Summary of statistics

	MSTUD	***GDPDIFF***	***RD***	***INFV***	***FDI***	***OPEN***
Mean	9.823117	27.56285	0.732757	3.963747	-0.999989	4.039079
Median	10.02668	27.82851	0.770108	4.149937	-0.941734	4.024679
Maximum	10.37751	28.64004	0.862890	4.713845	1.535109	4.481275
Minimum	7.812378	25.79430	0.559616	2.630449	-5.734803	3.602211
Std. Dev.	0.576632	0.759441	0.096110	0.672760	1.747195	0.189121
Skewness	-1.728140	-0.534306	-0.672140	-0.688799	-0.823707	0.158374
Kurtosis	5.838954	2.388267	2.009813	2.108375	3.350016	3.439601
Jarque-Bera	34.17612	2.590085	4.762082	4.600153	4.727474	0.501530
Probability	0.000000	0.273886	0.092454	0.100251	0.094068	0.778205

Notes : All the variables are in logarithm.

Before proceeding ARDL estimation, we determine the degree of integration of variables. To this end, we apply Dickey-Fuller (ADF) unit root test. The results are reported in Table-4. We clearly show that the variables are integrated either at level or first difference (I(0) and I(1)). Given this finding, the ARDL bounds testing approach can be used to test the cointegration hypothesis among variables. However, Perron (1989) shows that if a structural break is present in the dataset, the ADF unit root test may be ineffective. Therefore, the robustness of the results obtained from the ADF tests are checked by carrying out Saikkonen-Lutkepohl unit root test (Saikkonen and Lütkepohl, 2002) that considers the effects of breaks or shifts in the time series under consideration. Saikkonen- Lütkepohl test has the advantage that it does not require a priori assumption regarding the break dates, but it itself captures the exact structural breaks, if any.

Table 4. ADF Unit Root Test

Variables	Level		First difference	
	Statistic	lags	Statistic	lags
MSTUD	---	---	-3.7909**	0
GDPDIFF	-2.6295*	0	---	---
R&D	---	---	-4.5987***	0
INFV	-5.3514***	1	---	---
FDI	-3.1414	1	---	---
OPEN	-5.1030***	1	---	---

Notes: ***, ** and * imply significance at the 1%, 5% and 10% level, respectively ; The numbers within parentheses for the ADF and PP statistics represents the lag length of the dependent variable used to obtain white noise residuals ; The lag lengths for the ADF and PP tests were selected using Akaike Information Criterion (AIC).

Table-5 summarizes the main results obtained from the Saikkonen-Lutkepohl test. We find that the series are integrated of order 0 and 1. These results appear consistent with those obtained from the ADF test for the fact that there is a mixture between I (0) and I(1). This does not mean that the same time series are integrated of order 0 when using ADF and Saikkonen-Lutkepohl tests, which suggests that regime shifts in the variables in question are significant. Our findings from both tests (Table-4 and Table-5) show that none of the series are integrated of order 2 or higher. Thus, ARDL bounds testing approach is adequate and applicable.

Table 5. Saikkonen- Lütkepohl Unit Root Test

Variables	Level			First difference		
	statistic	lags	Breaks	Statistic	lags	Breaks
MSTUD	-0.3416*	1	1997	---	---	---
GDPDIFF	---	---	---	-2.7560***	0	2009
R&D	---	---	---	-2.9507**	1	1999
INFV	---	---	---	-2.4822***	0	2003
FDI	-2.8765**	0	2003	---	---	---
OPEN	-3.0443***	0	2003	---	---	---

Notes: The critical values are obtained from Lanne et al. (2002). The lag orders are determined by the Akaike Information Criterion. * and *** denote rejection of the null hypothesis at the 1% and 10% levels, respectively

According to the ARDL approach, to determine optimal lag length seems highly important for the model specification. To do so, various information criteria have been applied to determine the lag optimization based on lag-order selection. Among them, we use sequential modified LR test statistic, Akaike information criterion (AIC), Bayesian and Hannan-Quinn information criteria (Table-6). AIC is more parsimonious than other criteria since it provides more consistent results (Lütkepohl, 2006). We find therefore that the optimum lags are respectively 1 of the first function ($F1_{MSTUD}$) and 3 for the second function ($F2_{MSTUD}$) over the period of 1971-2011.

Table 6. Lag-order selection

$F1_{MSTUD}$ (MSTUD/GDPDIFF, R&D, INFV, FDI, OPEN, INST)						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	69.78036	NA	0.002584	-3.154464	-2.582638	-2.954882
1	69.83361	0.065092*	0.002749*	-3.101867*	-2.486054*	-2.886932*
2	70.09696	0.307235	0.002895	-3.060942	-2.401142	-2.830654
3	70.12032	0.025958	0.003095	-3.006684	-2.302898	-2.761044
$F2_{MSTUD}$ (MSTUD/GDPDIFF, R&D, INFV, FDI, OPEN, PAS)						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	64.41017	NA*	0.003752	-2.778928	-2.212930*	-2.579387
1	65.80397	1.732832	0.003703	-2.800215	-2.190678	-2.585324
2	66.89165	1.293460	0.003722	-2.804954	-2.151879	-2.574715
3	68.96120	2.349216	0.003554*	-2.862768*	-2.166154	-2.617179*

Notes: * indicates lag order selected by the criterion; LR: sequential modified LR test statistic (each test at 5% level) ; FPE: Final prediction error ; AIC: Akaike information criterion ; SC: Schwarz information criterion ; HQ: Hannan-Quinn information criterion.

In addition, our results reported in Table-7 reveal that the value of F-statistic exceeds the upper bound at the 1% significance level, implying that the null hypothesis of no long-run relationship can be rejected for $F1_{MSTUD}$. More precisely, the number of Moroccan migrant who opt for higher studies in France and its determinants including inflation volatility, *GDPDIFF, R&D, INFV, FDI, OPEN, INST* are cointegrated in the long term. However, the F-statistic seems insignificant for $F2_{MSTUD}$. Because the ARDL bounds testing approach can be vulnerable due its inability to detect regime chifts stemming in the variables, we used Gregory-Hansen (1996)'s method that accounts for nonlinearity to investigate the focal relationship. By doing so, we put in evidence from Table-8 that there is cointegration when accounting for nonlinearity for both functions under consideration ($F1_{MSTUD}$ and $F2_{MSTUD}$).

Table 7. The ARDL Bounds Testing Analysis

	Optimal lag length	F-statistic	Prob.
$F1_{MSTUD}$ *(MSTUD/GDPDIFF, R&D, INFV, FDI, OPEN, INST)*	0, 1, 1, 0, 1, 0	21.0998***	0.0001
$F2_{MSTUD}$ *(MSTUD/GDPDIFF, R&D, INFV, FDI, OPEN, PAS)*	0, 1, 1, 0, 1, 0	0.1332	0.7187
Significance level	Critical values: T=24		
	Lower bounds I(0)	Upper bounds I(1)	
1%	6.8052	7.9867	
5%	4.8961	5.7438	
10%	4.3122	4.8019	

Notes: ***, ** and * imply significance at the 1%, 5% and 10% levels, respectively Critical values were obtained from Pesaran et al. (2001).

Table 8. Gregory-Hansen Structural Break Cointegration Test

Estimated model	$F1_{MSTUD}$ *(MSTUD/GDPDIFF, R&D, INFV, FDI, OPEN, INST)*	$F2_{MSTUD}$ *(MSTUD/GDPDIFF, R&D, INFV, FDI, OPEN, PAS)*
Structural break year	1999	2004
ADF-test	-4.8203**	-3.6951***
Prob.values	0.0017	0.0009
Significance level	Critical values of the ADF test	
1%	-5.6829	-4.2573
5%	-4.7936	-3.8639
10%	-4.5481	-3.1970

Notes: ***, ** and * imply significance at the 1%, 5% and 10% level, respectively.

The results of short-run and long-run analyses for $F1_{MSTUD}$ and $F2_{MSTUD}$ from ARDL approach to cointegration are reported in Table-9. For the first function and especially in the short run, the GDP differential affects positively and significantly the number of migrant students. An increase by 10% in *GDPDIFF* increases the *MSTUD* by 3.90%. The R&D in France increases significantly the Moroccan migrant students in France, i.e. an increase by 10% in *R&D* leads to an increase in *MSTUD* by 10.74% in the short-run. The impact of inflation volatility seems positive but insignificant, while the foreign direct investments and the openness degree have no statistically significant effects in the short term. The value of *ECT* is negative and statistically significant for the two estimated equations, which is widely expected theoretically, i.e. it amounts (-0.0024 and -0.00065, respectively). This implies that the deviation in the short-run is corrected by 0.24% towards the long-run equilibrium path for function one (when accounting for *INST*) and by about 0.065% for function two (when considering *PAS*).

In the long-run, all the coefficients associated to the variables under consideration appear statistically significant. An increase by 10% in differential GDP between Morocco and

France increases the flows of migrant students to France by 2.78%. The impact of *R&D* on *MSTUD* seems much stronger than the rest of explanatory variables, i.e. an increase by 10% in the research and development might increase the migration of students to France by 23.70%, while that of *INFV* leads to an increase of students by 5.49%. However, the foreign direct investments and the degree of openness have significant downward effects (an increase by 10% in *FDI* and *OPEN* leads to a drop in the students' number by 0.23% and 14.67%, respectively). Seemingly, the impact of *INST* is negative and significant. The results do not change substantially in terms of signs and significance of almost all the variables either in the short or in the long terms when changing from $F1_{MSTUD}$ to $F2_{MSTUD}$, implying therefore the robustness of our findings. Nevertheless, in $F2_{MSTUD}$, the effect of openness becomes much more important than that of $F1_{MSTUD}$. In this equation, *OPEN* plays the major role in explaining the mobility of Moroccan students. The effect of *PAS* appears insignificant.

The R^2 values for the two functions in question shows that the number of migrant students from Morocco to France is 68% explained by *GDPDIFF, R&D, INFV, FDI, OPEN, (INST and PAS,* respectively for $F1_{MSTUD}$ and $F2_{MSTUD}$). The *R&D* plays the major role in explaining the increase in the number of students either in the short or in the long-run, whereas the openness through foreign direct investments appears minor in both short and long terms. The diagnostic tests indicate that there is evidence of LM-serial correlation (the Breush-Godfrey serial correlation) and well construction of the long-run model (the Ramsey reset test statistic), which highlights the adequacy of ARDL approach and the efficiency of ARDL parameters for the two estimated equations.

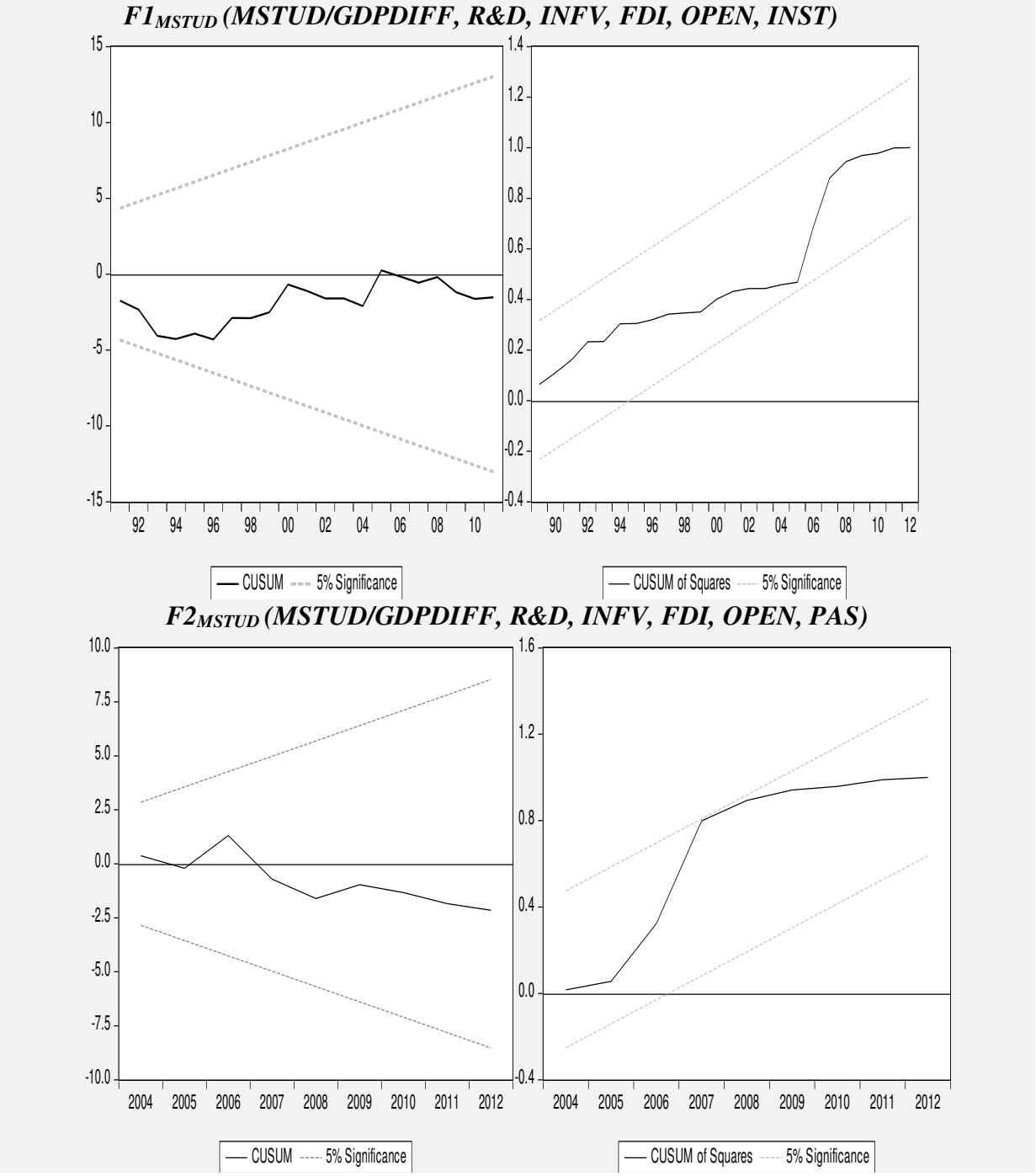
It is also well seen from the CUSUM and the CUSUM squares tests that all the graphs for the two considered functions are between the critical bounds at 5% level of significance (Figure-4), which reinforces the adequacy of the ARDL bounds testing approach and the stability of estimated parameters.

Table 9. Short-run and long-run Analyses

Dependent variable: $DMSTUD_t$		
	$F1_{MSTUD}$	$F2_{MSTUD}$
Short-run		
C	0.0814 (1.2973)	0.0297 (0.6655)
$DGDPDIFF_{t-1}$	0.3901* (1.5372)	0.1620* (1.5767)
$DR\&D_{t-1}$	1.0476* (1.6049)	0.6120* (1.5767)
$DINFV_{t-1}$	0.1228 (1.3771)	0.0099 (0.2452)
$DFDI_{t-1}$	-0.0026 (-0.2542)	-0.0129 (-1.0556)
$DOPEN_{t-1}$	-0.3350 (-1.2746)	0.2194 (1.2313)
ECT_{t-1}	-0.0024* (-1.8762)	-0.00065** (-2.4698)
Long-run		
$GDPDIFF_{t-1}$	0.2786*** (6.5583)	0.9409*** (3.3119)
$R\&D_{t-1}$	2.3708*** (18.4889)	3.3210*** (3.0178)
$INFV_{-1}$	0.5494*** (20.1816)	1.4523*** (9.6703)
FDI_{t-1}	-0.0232** (-4.3396)	-0.26353*** (-6.3230)
$OPEN_{t-1}$	-1.4677*** (-14.6791)	-4.1474*** (-5.4088)
$INST$	-0.9675*** (-29.8809)	---
PAS	---	0.0466 (0.4256)
R^2	0.68	0.68
LM-serial Correlation	6.2033 [0.0204]	4.6627 [0.0225]
Ramey Reset test	7.0066 [0.0144]	3.9654 [0.0603]

Notes : ***, ** and * imply significance at the 1%, 5% and 10% levels, respectively.

Figure 4. Plots of cumulative sum of recursive residuals



5.2.VEC Granger causality findings

To reinforce the above results, we evaluate whether there is a causal relationship between the explanatory variables under consideration and the number of Moroccan students in France. We do not assess the reverse nexus as is widely observed in other fields interested to the causality between two time series, since as mentioned above the link that runs from the *MSTUD to GDPDIFF, R&D, INFV, FDI* and *OPEN* has no sense on the studied issue. Before beginning the non-causality test, we should examine the residuals by carrying out the LM test for serial independence against the alternative of *AR(k)/MA(k)*, for $k = 1, ..., 12$. This serial correlation may be removed at the maximum lag length which is 2 (Table-10).

Table 10. VEC Residual Serial Correlation LM Tests

Null Hypothesis: no serial correlation at lag order h		
Lags	LM-Stat	Prob
1	32.16772	0.6515
2	29.37353	0.9948
3	40.74210	0.2696
4	21.10649	0.9772
5	27.67981	0.8384
6	41.74943	0.2351
7	24.33256	0.9304
8	36.88430	0.4278
9	60.43856	0.0066
10	51.79655	0.0428
11	39.01003	0.3360
12	24.77523	0.9210

The main results obtained from non-causality test are reported in Table-11. It is clearly notable that we cannot reject the null hypothesis of no causality nor from *GDPDIFF* to the number of Moroccan students in France, nor from *R&D* to *MSTUD*, nor from *INFV* to *MSTUD*, nor from *FDI* or *OPEN* to *MSTUD*. These results may have important economic implications.

Table 11. VEC Granger Causality/Block Exogeneity Wald Tests

Dependent variable: $DMSTUD_t$			
Excluded	Chi-sq	Df	Prob.
$DGDPDIFF_{t-1}$	2.750957	2	.2527
$DR\&D_{t-1}$	0.81613	2	.9600
$DINFV_{t-1}$	1.770490	2	.4126
$DFDI_{t-1}$	0.771514	2	.6799
$DOPEN_{t-1}$	0.715273	2	.6993

Notes: df denotes the freedom degree.

If in the short-term only income differential as well as *R & D* are significant, in the long term all variables are significant. Similarly, all considered variables cause (in the sens of Granger) migration of students. It should be noted here that the good quality of institutions in France (*R & D*) plays a fundamental role in the mobility of Moroccan students. However, the poor quality of Moroccan institutions (*INFV*) pushes them to leave their country with a low probability of return.

6. Brain drain or brain gain

International migration and remittances have been and continue to be looking as a development option for many developing countries. Without natural resources, Morocco has long considered migration as effective tool to drop with chronic macroeconomic deficits, and rampant unemployment and boost its economic growth. Furthermore, while international migration participates to improve international reputation of the country, student mobility clearly reinforces this strategy. This seems the most important regarding the inability of Moroccan economy to absorb all the new graduates that inefficient educational system nundates the labor market each year. This of course can explain the higher unemployment rate of graduates comparatively to non-graduates[9]. In fact, international student mobility has two clear objectives: first, to enable students to acquire knowledge and experience abroad; second, to return home after graduation. And even if a minority of the migrants is integrated in the host country, their migration can create some positive effects on the country of origin, termed the "brain gain" effect by fostering technological transfers and contributing for example in the international influence of Morocco through lobby of research, economy and business.

[9] In 2009 for example, the overall unemployment rate was 9%, while the unemployment rate of graduates was almost 20%.

Nevertheless, this is much less obvious in reality because there is any policy to encourage those who want to settle permanently in the host country to return home. Understanding the determinants of the mobility of Moroccan students represents therefore an important issue.

Our findings provide important lessons and offer additional insights about the migration determinants for both origin and host countries. If the Moroccan authorities turned a blind eye on the issue of return of migrant students, as if they implicitly encourage their migration regardless of their return, considering them as a common source of foreign exchange (via remittances); the French authorities are also satisfied with the current situation, given the number of Moroccan graduates and researchers who settle in France permanently. The question posed by this paper is very important and makes reference to ethical debate in the context of brain drain. It is heavily difficult to accept that the best trained human resources in the poor countries migrate to rich countries without any consideration. Especially when, France decide to implement a new immigration policy (June 2006) to encourage more talented foreign students graduated from a French institution of higher education to still in France ("*Migration choisie*"). One of the important measures of this policy is the three-year residence permit for highly-qualified students in order to enhance the development and attractiveness of France as leading research country. "To sweeten the pill" and counterbalance the negative effects of the brain drain, the French authorities have implemented mechanisms to assist the return of students and facilitate the movement of "brains", which were brought into the "original" concept of co-development . In preamble, it is noteworthy to pinpoint that the co-development policy is not efficient and operational, since it focuses on circular migration but returns actually are very scarce so that return migration is a total failure. It is important to acknowledge that the reason behind individual return migration is usually tied to economic opportunities. However, in the origin countries, a phase of increased growth rate did not benefit to all agents and could hit some workers so that inequality increases and reinforces the migration propensity. In other words, accelerating growth in the South provides no guarantee that migration will slow down. On the contrary it is quite possible that it speeds up, whereas a massive migration of skilled workers from Southern countries will slow down their growth rate.

The main issue is simple: how can France benefit from high skilled workers, stemming from the South, to boost its growth without depriving the countries of origin of a major source of development? In other words, how to turn brain drain into brain gain?

To be fruitful, the co development policy should use the opportunities provided by Diasporas. Surely, this highly skilled labour force is working in the North but it can contribute to the South development, not through a regulatory supply and demand mechanism, but through a societal action in which the identity process plays a crucial part. Diaspora networks provide somehow an historical shortcut, making in some unprecedented ways huge socio-cognitive abilities available everywhere. As they are familiar with the socio-political framework and the business climate in their host country as well in their country of origin, high skilled migrants are a significant asset. They can use their knowhow in order to contribute to the development of their host country and provide help to their country of origin through limited missions or long stays in research centres or local firms. Several countries such as India, Taiwan, China and others provide convincing evidence of this option efficiency, but also of its limits if it does not go with an actual cooperation and partnership policy between North and South countries. France and the relevant countries of origin have experimented such a scientific Diaspora option but without a great commitment. Paucity of funding devoted to co-development policy is a further proof that it is not taken seriously (Bouoiyour, 2006).

7. Conclusion

In this paper, we have analysed the determinants of migration of Moroccan students to France. We point out, first of all, that there are three facts rather alarming: i) a Moroccan national unemployment rate of 9% in 2011 and an unemployment rate of graduates of almost 20%; ii) Moroccan students constitute the largest foreign students quota in France (ahead of China, Algeria ...); iii) the rate of return of Moroccan students after graduation is 12.5%. It is therefore important to understand accurately the reasons for these facts and examine their interactions. This is what we tried to do throughout this paper.

Our empirical results show that the wealth differential between Morocco and France is the main determinant of student migration. This tends to confirm the migration for economic reasons. This is reinforced by the recent report data on migration in France which confirm that Moroccan student are more likely to change their status to remain inside the country after their studies, either for work or for family reasons. Therefore, in 2011, about 9,513 students who have applied for a change of status to the temporary worker classification, 1,765 were from Morocco (with a percentage of 18.5 %), this stills true despite the current crisis in

France and therefore a rising unemployment that will have implications for many migrants, but as long as the social system is tenable, it could encourages migrants/students to stay in the country. French R&D expenditure (proxy for institutional quality) seems as an important determinant of student mobility. France is indeed one of the leading research countries even if there has been stagnation in private and public expenditure on research and development in the recent years. We also find that the uncertainty about future inflation, used as proxy of Moroccan economic instability and usually live the weaker quality of institutions, encourages the departure abroad of students, while the degree of openness (determined through trade openness and foreign direct investments) discourages Moroccan students to migrate. The French institutional changes aimed at limiting the number of student entries also reduce the number of migrant students. Overall we can conclude that to limit the migration of Moroccan students, authorities must improve the quality of Moroccan institutions, attract more foreign investment and develop foreign trade.

Due to data limitations, the present paper will not present additional evidence on the determinants of student migration. In particular, push variables of students such as the unemployment graduates, the number of scientific publications and the expenditure on higher education in Morocco and pull factors such as spending on higher education in France are not available in long periods. We believe that we would find the same results obtained with the variables used in the present work. In contrast, this study contributes to the small literature on student migration and identifies the objectives, the logic and the migration policy interactions among countries like France and Morocco. We have suggested ways of thinking and recommendations, which can be convincingly presented to the policy-makers. In particular, since France needs students and executives coming from South for strengthen its R&D and boost its economy, it is possible to imagine a creation of a stable legal status (i.e. a possibly legally and permanently resident in France) in order to reinforce the links between the Moroccan Diaspora and its country of origin and to favour skill transfers between North and South. We also recommend to encourage academic exchange agreements, which may allow Moroccan students, for example, to spend a semester abroad. In addition, the introduction of co-supervision of PhD theses could develop cooperation between Moroccan universities and French universities. This is a research supervised simultaneously by French (or other nationality) and Moroccan directors through international agreements between universities. Furthermore, apart from establishing a competitive environment that leads to improve academic research in poor countries such Morocco, there is a need for and “value added” of the university research centers and support the students who wish initiate research projects

after their graduation. A deal can be found, a win-win situation, such as creating Franco-Moroccan research centres accredited by universities in both countries, where students can move freely between countries.

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