Globalization and Migration:

a "Unified Brain Drain" Model

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Abstract

Globalization has led to a vast flow of migration of workers but also of students. The purpose of this paper is to analyze the migration of individuals encompassing decisions already at the level of education. We develop a "unified brain" drain model that incorporates the decisions of an individual vis-à-vis both education and migration. In the empirical part, this paper addresses international flows of migration within the EU and presents strong evidence of concentration of students in countries with high-quality education. This phenomenon, as the usual brain drain, has two opposite effects on social mobility.

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I. Introduction

The analysis of migration has become an important branch of the literature on globalization. One of its main domains is concerned with the phenomenon of Brain Drain which underlines that the flight of skilled workers reduces economic growth in the countries of origin.

However, this literature is somehow restrictive. Globalization has not only affected the movement of workers but also of students. In consequence, the analysis presented in the brain drain literature is focusing only on one part of the story. For many countries which suffer brain drain, the full story is not only of the flight of skilled workers, but of bright young people not yet skilled.

Indeed, the brain drain theory describes the decision of the individual when he has already acquired some human capital in his country, and then decides to move. However, globalization permits a more general set of decision choices. First, the individual decides where to learn, and afterwards he decides where to work.

In other words, this paper will take a more global view than the usual literature on brain drain. The reason to incorporate brain drain in a larger set of decision of the individual is that, in the past decade, the flow of young individuals migrating to acquire education is growing rapidly. In 2006, the flow of individuals who obtain education outside their country of citizenship was nearly five times what it was in 1975. Over time, this flow has become larger than the flow of workers. More specifically, from 1999 to 2006, the growth rate of student flows to the OECD countries was twice that of flows for the purpose of finding employment.[1]

The purpose of this paper is to analyze the migration of individuals encompassing decisions already at the level of education. We suggest building a "unified brain-drain" model. In other words, the previous literature on migration has focused on two subjects in total dichotomy. On one hand, there is the literature analyzing the cost-benefits of students. On the other hand, there is the regular brain drain literature analyzing the labor market, and the migration of already skilled labor.

We combine these two migration decisions into a unique model, and develop a simple two-step model that describes the decisions of an individual vis-à-vis education and migration. In the first step, individuals decide where to study (i.e., in country of origin or in a foreign country); and in the second step, they decide where to work.

Since this model is quite new, in this research we take the strategy of first finding the empirical regularities, before investing in heavy modeling. Therefore this paper will mainly be empirical, and we just present two main theoretical results linked to this new structure.

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[1] The flow of workers has increased by 27% while that of students by 52%.

One can ask why does it make a difference whether we analyze the decisions in a single model, or we analyze migration step by step. The reason is that we can get different solutions under these two strategies of modeling, the main reason being that costs of migration are different at the different stages of life, as we emphasize in the section presenting the model.

We show that, due to the fact that psychological costs increase with age, and costs of moving are greater after graduation, then under plausible assumptions, the usual brain drain strategy is sub-optimal. In the past, migration of students was not a possibility and students were learning in their own country. Globalization today is opening this type of migration at least for students from OECD countries, and in the future, probably from the whole world. Therefore it is important to notice that brain drain which was (and is) the optimal solution for individuals of countries without the door open to higher education abroad, will give place to the strategy we stress in our model.

This model will also allow us to pinpoint the optimal decision of young individuals, as well as to analyze the effects of wages and quality of education on the decision making of students. We show that one of the main variables affecting the decision about the country of migration is its quality of education, a variable which has not been stressed enough in the literature.

The second part of the paper is empirical. This paper will analyze the pattern of flows between countries, and will identify the reasons why students migrate. Our empirical work will have two main results: the first is that, indeed, quality of higher education affects the probability of migration. The second main result is that there is a concentration effect. We find that not only does high education quality affect migration, but the movement of students is concentrated towards the top 5 countries.

This fact has strong redistribution effect, as the usual brain drain. On one hand, the students who move to countries with good universities have a better chance to go up the ladder to success, if they come back to their country of origin. On the other hand, if they don't return, the country has lost its young individuals, which will lead to lower economic growth.

This paper is organized as follows: In the next section, we present a short overview of the literature. In section III we develop the model of migration. In the forth section we present the data, and explain the methodology. In the fifth section, we present the empirical results, and section six concludes.

II. Facts and Related Literature

In the model, we present below, we discuss the decision of young individuals to migrate abroad and attend a foreign university. This decision cannot be disentangled from the decision regarding work. Therefore, we will present in brief the literature

on student migration, as well as that related to migration of skilled workers. We begin with the literature focusing on student migration.

1. Migration of Students

The literature on student flow is not large, and is mainly empirical. In Table 1, we present the data on student migration in general and from OECD countries in particular, along with data for some other countries. Comparing it with data on brain drain, the flow per year are quite significant for OECD countries.

The studies in this field mainly outline the elements affecting the costs and benefits of students' migration (see Kyung, 1996; Bessey, 2006; and Agasisti and Dal Bianco, 2007). Heaton and Throsby (1998) focuses on the determinants of flows of students, using also a cost-benefits framework.[2]

The literature has stressed that wage level is one of the main elements affecting the decision to migrate as a student. On one hand, Mac and Moncur (2001) found that higher wages in the country of origin positively affect the rate of out-migration. It is so, because agents with higher income can bear the costs of migration more easily and have better possibilities to invest in high quality of education.

On the other hand, wage differences between the host country and the country of origin are also used to explain the patterns of migration. These studies show that flows of students are from low-wage to high-wage countries because students are motivated by the wish to exploit the opportunity to acquire employment in the country wherein they acquired their education (see Rosenzweig, 2006).

There is also a literature which focuses on the macro effects of migration. Papatisba (2005) argued that studying overseas enhance the social and cultural development of migrants and therefore leads to human capital gains. Moreover, she stresses that migration could be a political means to foster technological transfers and economic integration of Europe.

Some scholars emphasize also the negative effects of migration on the stock of human capital. Poutvaara (2004) argued that while migration fosters private investment in human capital, it will lead to a reduction of public investment in education, due to free riding.

Following this line of reasoning, Mectenberg and Strausz (2008) underlined the tradeoff facing government, i.e., competition versus free riding. On one hand, a central planner may decide to invest in quality of higher education in order to attract foreign students, and due to more competition, increases the amount of investment. On the other hand, the central planner might encourage local students to obtain education overseas free of charge. This free-riding on the account of another country reduces the total amount of investment in higher education.

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[2] See also Altbach, 1998.

The literature regarding mixing decisions of working and learning is seldom. Kwok and Leland (1982), develop a multiple equilibria model of migration based on asymmetric information, wherein students prefer to remain in the country where they attended university, due to a lack of information on the "value" of their degrees. So due to signaling, good students find it more valuable to remain in the host study countries to work. In consequence, students with less "internal information", i.e., those with lower abilities, will bet those who decide to return to their countries of origin.[3]

There are also studies on the effects of migration on the social environment as more migration will lead to a reduction in cultural differences over time (see Putvaara, 2004 and Mechtenberg and Strausz, 2008). We now turn to the literature on the migration of workers.

2. Migration of workers

In contrast to the literature on student migration, the literature on workers' migration is vast. From Sjaastad (1962) on, the optimal behavior of migrants has been found to be a function of income differences and migration costs.[4] The main elements that have been emphasized are those affecting migration costs, as for instance, geographical distance, family size, and previous migration.[5] This literature did not focus on skilled workers.

The literature on the migration of skilled workers is coined the "brain drain" literature, and it emphasizes the negative effects of the flight of skilled workers on the country of origin. These studies claim that the flight of skilled workers towards countries with higher standards of living lead to impoverishment of developing countries, due to increasing returns and externalities in the level of human capital. These papers conclude that migration of skilled labor has negative effects on human capital and economic growth of the country of origin.[6]

Lately, a number of authors have shown that the possibility of migration might create some positive effects on the country of origin, termed the "brain gain" effect. This line of research has been engaged in by Mountford (1997), Stark, et al. (1997, 1998) and Stark (2004). An overview of this literature can be found in Docquier and

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[3] Nowadays, there are some models with multiple equilibria. See De laCroix and Docquier (2012) and Benassy and Brezis (2012).

[4] See Borjas (1987, 1989) and Chiswick (1999). The seminal work of Harris and Todaro (1970) adds to previous work the possibility of unemployment, and therefore focuses on the net expected present value as the element that explains migration.

[5] The main empirical papers in this literature are those of Greenwood (1969), Bowles (1970), Kaluzny (1975), Lee and Roseman (1999), and Ahn et al. (1999). The variables on which they focus are mainly income, age, and distance unemployment.

[6] See Hacque and Kim, 1995 and Docquier, 2006. Early articles in this direction are notably Grubel and Scott (1966) and Bhagwati and Hamada (1974). A summary of this literature can be found in Docquier and Rapoport (2012).

Rapoport, (2008, 2012) and Gibson and McKenzie, (2011). They focus on the fact that the incentive to migrate could increase the investment in education, and on average would increase the level of human capital. Beine, et al. (2001) and Easterly and Nyarko (2008) both derive the theoretical effects of migration on human capital creation, and test these effects empirically.

This paper will not draw a dichotomy between decisions on education and those on employment. Instead, it will combine these two into one model, presented in the next section.

III. The Model

In this study, we develop a model that allows us to develop a cost-benefit analysis of migration decisions. Unlike previous studies, which have analyzed migration of students and workers separately, we combine these two decisions into a single model. The model will analyze under which conditions, the usual brain drain strategy is sub-optimal and therefore in countries where globalization is such that young individuals can already travel for education, it is optimal to do so.

In this paper we focus on two main elements: wages and quality of higher education. The model we develop is the following: In the first step, individuals decide where to study, and in the second step, they decide where to work. Wages affects net income in a direct way, while the quality of education affects the level of human capital.
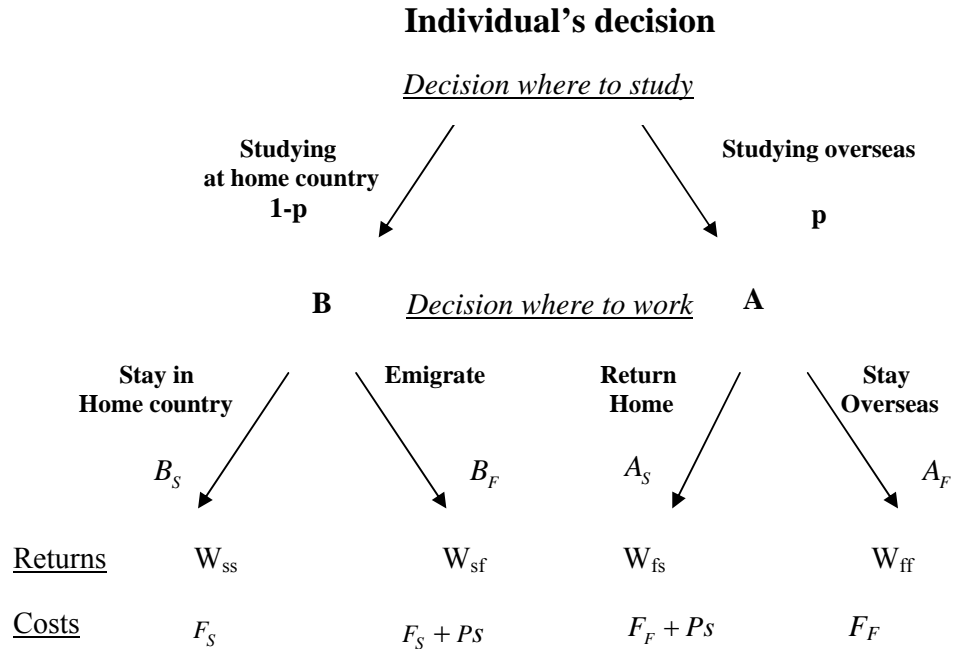
We should underline that quality of higher education is not stressed enough in the literature of development in general, and migration in particular. The literature which focuses on human capital, usually define human capital by the number of people who have education. This is a quantitative variable. But, can we compare a BA from an unknown college to a graduate from Harvard, or from some other top 10 universities? [7] This paper takes into consideration that students know that their human capital is a function of the quality of the university in which they have received their education. In consequence, in this paper, we focus on the heterogeneity of higher education, and we test its effect on the decision of migration.

Let us turn to the general model. In Chart 1, we show the elements affecting the decisions at each stage of this model.

In the first period, individuals invest in acquiring human capital, H, and decide whether to study overseas in country F, or in his home country, in country S. Their decision is a function of the costs and the returns from acquiring human capital. In the second period, they decide where to work.

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[7] There are few papers which discuss the notion of quality of higher education, see in particular Brezis (2012). On the relation of quality of secondary education and human capital, see Card and Krueger (1992) and Hanushek and Wossman (2007).

Chart 1

Individual's decision

Decision where to study

**Studying
at home country
1-p**

Studying overseas

p

B   *Decision where to work*   **A**

| **Stay in Home country** | **Emigrate** | **Return Home** | **Stay Overseas** |

B_S B_F A_S A_F

Returns W_{ss} W_{sf} W_{fs} W_{ff}

Costs F_S $F_S + Ps$ $F_F + Ps$ F_F

The main idea of this two-steps model is that the decision to work is not completely independent of the decision the individual took previously in the first period. The main assumption is that the psychological costs of moving are different when young or when adult. This will drive the main results of the paper. The second assumption is related to the psychological costs of returning, vs. its new "identity" as a student, as we explain later on. Depending on these assumptions, we determine the optimal decision.

The model will be presented succinctly, and this paper is mainly empirical. We will be cautious to stay general, so that it will permit in the empirical part to check different variables. Still, this paper mainly focuses on wages and quality of education, and check how the equilibrium will be affected by these two variables, as well as the costs of migration.

1. Returns from Migration

One main element which affects the future income of students is the accumulated human capital. This accumulated human capital is a function of the quality of higher education they have acquired, as we stressed above. Students are aware that quality of higher education is heterogeneous and varies across countries, and the higher the quality, the higher the human capital they are acquiring. The second element which influences the future income of students is the wages paid for a given amount of human capital.

So, individual's earning is a function of three factors: (i) the quality of higher education, Q_i which affects the accumulated human capital (where i is the index of the country in which he gets an education), (ii) a idiosyncratic factor specific to the individual, λ, and in this section, we take λ constant for all students, assumption which will be removed, when we will develop the macro equation of migration. (iii) The third element is the wage per unit of human capital, w_j where j is the index of the country in which the individual decides to work (country S or country F). The income of individuals takes the four possible forms:

(i) <u>Migration as student and staying to work</u> – strategy A_F.

Agents migrate in the first stage to country F in order to obtain education and remain there after graduation.[8] The income in this specific strategy is a function of Q_F and w_F and for sake of simplicity, we adopt this specific functional form:

$$W_{FF} = \lambda \psi(Q_F, w_F) = \lambda w_F Q_F^{\alpha}. \tag{1}$$

where W_{FF} are the earnings of an individual that obtains education and works in country F. The second possible strategy is:

(ii) <u>Temporary migration</u> – strategy A_S.

Individuals migrate as student but later on return to their home country after graduation. The earnings under this strategy is a function of quality of education overseas, Q_F and wages at home, w_S:

$$W_{FS} = \lambda \psi(Q_F, w_S) = \lambda w_S Q_F^{\alpha}. \tag{2}$$

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[8] We ignore the whole present value of income, and focus on the earning of a specific year, since discount factor will affect all incomes in the same way.

(iii) <u>Permanent migration only as worker</u> – strategy, B_F

The third possible strategy is that an individual will obtain education in his home country and migrate in order to work, following graduation. This is the usual "brain drain" strategy. The value of earnings under this strategy is a function of quality of education at home, Q_S and wages overseas, w_F:

$$W_{SF} = \lambda \psi(Q_S, w_F) = \lambda w_F Q_S^{\alpha}. \tag{3}$$

(iv) <u>No migration</u> – strategy, B_S.

An individual obtains education in his home country and remains to work there following graduation. The present value of earnings over time under this strategy is:

$$W_{SS} = \lambda \psi(Q_S, w_S) = \lambda w_S Q_S^{\alpha}. \tag{4}$$

So all four strategies present different returns depending on where the student learns and where he works. We now turn to the main costs related to learning and migration.

2. Costs of Migration

The literature of migration stresses two main types of costs that individual bears during migration: financial costs and psychological costs.

(i) Financial Costs

When migrating as a student, we assume that the main financial costs of migration are tuition fees. Therefore, if the individual obtains education in his home country, the amount of tuition fees that he pays are F_S and if he obtains education overseas he pays tuition fees which are charged in the host country, F_F.

(ii) Psychological costs

Sjaastad (1962) argued that migrants bear costs which results from separation from family and friends. This definition of costs is known in the literature as psychological costs. The new literature developed by Akerlof and Cranton (2010) also put an emphasis on "identity". This literature takes into account that one of the main element people care about is their identity, or in other word, their culture.

In consequence, when a person leaves home, he has the cost of leaving his own culture and adapting to the new one.[9] These costs are positively affected by the cultural differences between the sending and the receiving countries.

This phenomenon of adapting to a new culture is coined as acculturation (see, Narchal, 2007). Theories of acculturation stress that the interaction between different cultures and adaptation to the majority's culture, lead to a process in which the migrants are losing their own cultural identity.

Therefore, this process bears psychological cost, Ps, which depends on the cultural differences between the origin and the destination countries. To leave the function as general as possible, we define:

$$P_S = \beta \, C_u. \tag{5}$$

where Cu is the differences between the culture of the migrant and the culture of the majority in the destination country, and $\beta > 0$.

The literature emphasizes that these psychological costs are much bigger for adults than young individuals starting learning. Therefore in this paper, we assume that these costs are borne only by adults migrating, and that these costs are small for students (and for sake of simplicity, we assume them to be zero).[10]

We are aware that the notion of "identity" that we proxy by difference in culture is not as simple as we assume in this paper. There are the values of home and family vs. the values of the identity adopted while learning. We will assume that the student feels more integrated in the host country than in his own home country. Since we assume a two-step decisions model, then the psychological costs will also occur when he returns home. We are aware that this possibility can lead to time inconsistency. Moreover, for sake of simplicity, we have defined a unique variable for psychological costs.

In summary, the net income under each of the strategies are as follows:

A_F $\qquad$ $NV_{AF} = \lambda w_F Q_F^{\alpha} - F_F$ $\qquad$ (Ci)

A_S $\qquad$ $NV_{AS} = \lambda w_S Q_F^{\alpha} - (F_F + Ps)$ $\qquad$ (Cii)

B_F $\qquad$ $NV_{BF} = \lambda w_F Q_S^{\alpha} - (F_S + Ps)$ $\qquad$ (Ciii)

B_S $\qquad$ $NV_{BS} = \lambda w_S Q_S^{\alpha} - F_S$ $\qquad$ (Civ)

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[9] Some psychologist will also emphasize the costs of loneliness and isolation; Others argued that as a result of changes in the identity of the individual, mental illness might appear (see Bhugra, 2004).
[10] In the empirical part, we still will check whether there are affecting migration.

3. Optimization

Individual decides whether to migrate for education purpose or later on as skilled worker, according to the net return under each of the strategies. From comparison of the net returns under each of the strategies we get the following Proposition.

Proposition 1:
Under Condition I, Brain Drain (strategy B_F) is suboptimal and individual will prefer either to leave their country already as a student, or to stay in their home country. In other words, when tuition fees abroad are not much higher than in the home country, brain drain is not the optimal option.

$$\text{Condition I:} \qquad (F_F - F_S) < P_S + \lambda w_F (Q_F^{\alpha} - Q_S^{\alpha}).$$

Proof:
In appendix A, we show that given condition I, we get either

$$B_S \succ B_F \qquad \text{or} \quad A_F \succ B_F.$$

This proposition states that under Condition I, there is always a strategy which will be better that B_F, the usual brain drain. The meaning of Proposition 1 is that when we allow for migration of students, and do not restrain ourselves to the question of migration as adult, then we get that the strategy of brain drain is sub-optimal, and it is one of the other strategies which is optimal. Still the brain drain strategy, B_F is commonly used for individuals from poor countries who cannot afford learning abroad, and for whom tuition fees abroad are too high. They move when they have saved enough to travel to the developed world.

This two-steps model is especially important for countries in the border of the developed word, from which students can easily travel to learn. This model shows that they will either stay in their countries, or move when they are still young. For them, the strategy B_F is sub-optimal.

This model encompasses the idea that in the past, when learning overseas was not as easy as today, brain drain was more frequent. In the future, we will face a structure in which bright people, with secondary education will leave the country to learn overseas, and will not come back, unless for them, the "previous identity" or family ties are essential elements of their well being.

This model can also be used to discuss the consequences of the Bologna process on migration of students. It should be noted that tuition fees for students belonging to the EHEA (European Higher Education Area) will be different than for students

coming from outside this area, since the Bologna Process ensures that tuition fees are equal for all students from the EHEA, while for students from outside this area, tuition fees will be much higher. In consequence, we get the following Proposition.

Proposition 2:
Under the assumption that tuition fees are similar, the two optimal solutions are either A_F or B_S, given the condition presented in the appendix.

Proof: (see appendix B)

This proposition will permit us to use the Borjas model (1987), in order to analyze empirically the elements which affect migration.

IV. Empirical analysis

In this section, we develop the equation of migration. This will permit to relate the theoretical model presented in the above section, to the empirical investigation which will be presented in the next section.

The previous propositions lead to the conclusion that under the assumptions presented in the appendix, the only two optimal strategies are strategy A_F i.e., to migrate as student and remain in the host country; or strategy, B_S, i.e., not to migrate at any stage.

These two optimal strategies will permit to find the equation to be estimated, and which is based on the model of self selection developed by Borjas (1987). In this part, we assume that λ is not anymore constant for all migrants, but it is different among countries. We define λ_F and λ_S the returns on personal characteristics in country F and country S respectively. Following Borjas we also assume that $\ln \lambda_F \sim N(0, \sigma_F{}^2)$ and $\ln \lambda_S \sim N(0, \sigma_S{}^2)$.

Recalling that the net returns under the two optimal strategies are:

$$A_F : \quad NV_{AF} = \lambda_F w_F Q_F^\alpha - F_F \tag{Ci}$$

$$B_S : \quad NV_{BS} = \lambda_S w_S Q_S^\alpha - F_S \tag{Civ}$$

In the theoretical model, we have assumed that psychological costs of students are zero, and we have ignored some other moving costs of the form of distance, and language. In consequence, in this empirical part, we assume that students suffer from moving costs, K. This will permit us to check whether they affect migration.

In consequence, we get that:

- If $I > 0$, then individuals migrate;
- and if $I < 0$, then individuals do not migrate,

where I is:

$$I = \ln[\frac{A_F}{B_S}] = \ln[\frac{\lambda_F w_F Q_F^\alpha - (F_F + K)}{\lambda_S w_S Q_S^\alpha - F_S}].$$ (8)

It follows from equation (8) that:

$$I \approx [W + q + E] + X$$ (9)

where

$$W = \ln w_F - \ln w_S$$ (10)

$$q = \ln Q_F^\alpha - \ln Q_S^\alpha$$ (11)

$$E = \ln F_S - \ln F_F - \ln K$$ (12)

$$X = \ln \lambda_F - \ln \lambda_S$$ (13)

Therefore the probability, P, of emigration from country S to country F is:

$$P = \Pr[X > -(W + q + E)] = \Pr\left[\frac{X}{\sigma_X} > \frac{-(W + q + E)}{\sigma_X}\right] = 1 - \phi(Z)$$ (14)

where $Z = -(W + q + E)$, σ_X is the standard deviation of X, and ϕ is the CDF function of the normal distribution. From equation (14) it follows that that the emigration equation from country S to country F is therefore:

$$P = 1 - \phi\left[\frac{-[\ln w_F - \ln w_S + \ln Q_F^\alpha - \ln Q_S^\alpha + \ln F_S - \ln F_F - \ln(K)]}{\sigma_X}\right]$$ (15)

Let us now turn to the regression of equation (15). We start with some clarification on the specification of the empirical model. We then present the data.

1. The specification of the model

In this empirical part, we regress the probability of migration as a function of the elements that appears in equation (15): wages, quality of education, and tuition fees. To these variables, we add a variable checking if there is a different behavior when an individual belongs to the EU. Moreover, in order to check whether there are some moving costs K, we include four different variables: the distance between countries; whether it is the same language; if their culture is similar; and if the education system is similar. In consequence, we estimate the following equation:

$$Pmig = \alpha + \beta_1 \Delta Wage + \beta_2 \Delta Cu + \beta_3 \Delta Tuition + \beta_4 \Delta Tuitionsq + \beta_5 EU_F + \beta_6 \Delta Quality$$
$$+ \beta_7 Distance + \beta_8 Similarity + \beta_9 Language + \beta_{10} Top5 + \beta_{11} Wage5 + u + \varepsilon$$

(16)

We investigate this equation with a country fixed effect, u and analyze a panel data of students' flow published by the OECD on the years 2001-2006, and we focus on a sub-sample of the European OECD countries.[11]

The decision on migration is a qualitative variable, based on macro-data, therefore, we use a logistic transformation when estimating equation (16). Let us recall that in our theoretical model we used, as Borjas, the normal distribution while in this analysis we use the logistic distribution. Since the normal distribution and the logistic distribution are similar in their bell curve and in their practical uses, the results are similar. Let us now describe the variables in equation (16).

2. The variables of the model

Pmig is the dependent variable which is a logistic transformation of the probability to emigrate from country S to country F. The dependent variable is therefore:

$$Pmig = \ln \frac{P_{SF}}{1 - P_{SF}}$$

(17)

where P_{SF} is the probability to migrate from country S to country F, calculated by dividing the number of foreign students from country S in country F by the total number of students in country S.

$\Delta Wage$ is the difference in the monthly average wage in manufacturing between country F and country S, based on the ILO database.

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[11] We use two samples: the first is the overall sample which contains data on migration of students from the EU27, Switzerland and Norway towards twenty one European OECD countries. The second sample is the EU15 which contains data on migration within the EU15 area.

Δ*Quality* measures the differences in quality of higher education between the sending and the receiving countries. Our quality index defines the quality of higher education in a country according to the number of universities in this country which are ranked among the world's top 100 universities. Therefore the quality of country is higher when it has more universities which are ranked in the top 100. There are two main ranking of universities in the world – the THES and the SJTU (Shanghai Jiao Tong University). We have chosen to use the SJTU ranking since it uses criteria of research quality, research productivity, quality of the faculty and quality of teaching. Some previous work (Mac and Moncur, 2001) uses instead the expenditure on education, but OECD research has shown that the correlation between budgets and quality is weak.[12]

Δ*Tuition* is the difference in tuition fees between the origin and host countries. The data on tuition fees are based on the report by CESifo Dice for the year 2005. We should note that tuition fees in Europe are very low and in many countries students obtain education free of charge.[13]

Δ*Tuitionsq* is the square difference in tuition fees between the sending and the receiving countries.

EU_F is a dummy variable which receives the value 1 if the destination country is a member of the EU.

Distance measures the geographical distance between the capital cities of the origin and the destination countries. The series are based on the Gleditsch and Ward (2001) database. This variable is part of the moving costs.

Δ*Cu* is an index of cultural differences between countries. We developed this index based on World Values Survey which publishes data at an interval of five years.[14]

Similarity is a dummy variable which get the value 1 if the structure of higher education in the sending and the receiving countries was similar prior to the adoption of the Bologna process. We divided the countries into two different groups. The first group includes the countries which, prior to Bologna process, had the three cycles of degrees and the second group includes countries with structure similar to the German system. As we will show, this element is important for understanding migration in Europe. Table 2 presents the percent of students who migrate to countries which had similar structure of degrees to the structure that in their country of origin. For example, Table 2, row 1 shows that 81.3% of the Austrian students,

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[12] It should be noted that our own index has also some weakness, because many countries don't have universities which are ranked in the world top 100. As a result this index provides information on a limited set of countries.

[13] It is important to note that the EU forbids discrimination regarding tuition fees that are charged from EU, EEA citizens and citizens of countries which have special agreements with the EU. Since all the countries in our data are either EU countries or countries which have agreement with the EU, tuition fees are the same for local student as well as for overseas student.

[14] We use the survey done in 2000.

who studied in 2001 out of Austria, chose to study in destination country which had, prior to the Bologna process, the same structure of higher education as in Austria.

Language is a dummy variable that gets the value 1 if the official language in the origin and the destination country is the same.

*Top*5 is a dummy variable which gets the value 1 if the destination country is one of the five countries which has the highest quality of education according to top100 index of quality. In fact, we use this variable to measure concentration by quality. The top five countries are France, Germany, UK, Switzerland and Sweden.

Wage5 is a dummy variable which get the value 1 if the destination country is one of the five OECD countries with the highest wage in manufacturing. The top five countries are: Austria, Denmark, Holland, Norway and Switzerland.

Finally, *u* represent a fixed country effect and ε is the random error.

V. Empirical results

The results of our analysis are presented in Table 3. In all regressions, the dependent variable *Pmig* represents the transformation of the probability to emigrate from country S to country F according to the logistic distribution.

In the first and third columns of table 3 we present the regression in the overall sample and in the second and forth columns we present the regressions for the EU15 sample. We divide our empirical results in two groups: the main results, and some more interesting results.

<u>1. Main results</u>

(i) Wages and Quality of Education

Table 3, columns 1 and 2, present the results when the explanatory variables are quality of university and the gap in wages between the country of origin and the host country.

We find that in both samples (total sample and the EU15), there are significant negative effects of wage differences on migration of students (see columns 1 and 2). This result is interesting because the literature stresses that wages are a positive and significant element in the decision of student migration (see Rosenzweig 2006). Our paper shows that this is not so. This result is puzzling and needs some more research. We return to this question below, and we focus now on the element which is significant and positive: the quality of higher education.

Δ*Quality* - Following our theoretical model, positive quality differences between the receiving and the sending countries is expected to encourage students to migrate. Indeed, we find a positive and significant effect of the quality of higher education on the probability of students' migration (see columns 1 and 2).

In conclusion, we find negative and significant effect of wage differences on migration of students and positive and significant positive effect of quality of education on migration.

(ii) Top Wages and Top Quality of education

We also would like to check whether quality of higher education or wage lead to some concentration effect. In order to explore this effect, we add two dummy variables in columns 3 and 4 of Table 3. The first one is *Top5-quality*. This variable gets the value 1 if the destination country is one of the top five countries in quality of higher education. This variable measures concentration of students in top quality countries.

Similarly, we add the variable *Wage5* which measures whether the destination country is one of the five countries with the highest wage. In other words, this variable measures concentration of students in high wage countries.

The results show positive and significant effect of the *top5-quality* variable and negative and significant effect of the *wage5* variable. Therefore we find evidence that the pattern of flows is to countries with high quality of universities and not to countries with high wage.

This result is puzzling as we have stressed above. It also leads to think that maybe the unified brain drain model should be refined to take these elements into consideration. Our results seem to show that students study where the higher education is best, but where wages are not the highest. Indeed, in table 4, we present the correlation between wages and quality of higher education. We find that the correlation between wages in manufacturing in each country and its number of universities in the world's top100, top 200 and top500 universities is around 0.35. Therefore the countries with the highest quality of education are not necessary the countries with high wages. This could be explained by more flexibility in the labor market, which is a positive element for students which just have finished to learn and are without experience.

The concentration effect stressed in Table 3 can be presented in a different manner in Tables 5a and 5b, in which we present the distribution of student flows according to quality of higher education (in Table 5a), and according to wages (in Table 5b).

Table 5a shows that in all the years 2001 to 2006, around 67 percents of student flows in the OECD and EU countries concentrated into the top five countries in quality of higher education.[15] Are these flows also concentrated in the top five countries in wage?

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[15] More specifically, around 19 percent of students went from low quality countries to low quality countries. Around 48 percent went from low quality countries to the top five countries, 14 percent from the top five countries to the low quality countries, and 19 percent were between the top five countries.

In table 5b we measures concentration in countries with the highest wage. We show that more than 80 percent of the student flows went to the low wage countries. Therefore, unlike the concentration of students in high quality countries, we don't find concentration in high wage countries.

<u>2. Some more interesting results</u>

The next four variables, *similarity*, *language*, *Distance and culture* are related to the moving costs, K.

Similarity - measures similarity between the structure of higher education in the host and origin countries. When the structure of the systems is more similar the compatibility costs are lower. In our empirical investigation, this variable was not significant.

Language – In all regressions, we find a positive effect of the same language in the host and the origin countries on migration. Note that this positive relation was also found in previous studies.

Distance – Similar to previous studies on migration, we find negative effect of distance between countries on migration.

ΔCu - Table 3, row 3 shows that higher cultural differences, as reflected by the cultural index, reduce significantly the rate of migration in all four regressions.

These results lead us to conclude that students are also affected by some moving costs. Are the tuition cots affecting migration as emphasized by the literature?

$\Delta Tuition$ - A priori, we expected to find negative effect of tuition fees gap on migration, but we found positive effects. Already Mak and Moncur (2001) found also positive effect of tuition fees on migration of students, while Bessey (2007) found insignificant effect. In this paper we also find a significant and positive effect of tuition fees gap on migration in both samples, meaning that students migrate to countries with higher tuition fees. This positive effect could be due to a signaling effect of the level of tuition fees on the quality of education.

$\Delta Tuitionsq$ - The positive effect of tuition fees on migration led us to check whether there is a non linear relation between tuition fees and migration. The results are not clear cut.

EU_F - We get a positive and significant effect of the host country being a member of the EU. There is clearly a club effect since migration to the EU area could raise the returns on migration.

VI. Conclusion

This past decade, cross-national migration of young people has become an important issue in the policy arena for two main reasons. The first is that the European Union has decided upon establishment of a European Higher Education

Area, thereby allowing and even encouraging free movement of students between European Union countries.

The second issue related to migration of students is the increasing global competition on talents. In the past, the elite of most countries were educated in their own countries. Today, an element common to many of the elites is that they share a common education and for many of them, they have attended the same elite universities, which are not in their home countries. In consequence, the issue of social mobility has become linked to the international movement of students. An obvious question is then what determines the direction of student mobility? This is the topic of this paper.

The first contribution of this paper is that it has stressed that to answer these types of questions, we cannot use a conventional model of migration which naturally limits itself either to student migration, or to migration of workers. We developed a unified brain drain model, that merges the decision to migrate as a student with the decision to migrate as a worker. Our first result is that the usual brain drain is sub-optimal. The second result of this paper is that migration is towards the countries with higher quality of education.

This issue might appear redundant, since *a priori*, countries with high wages will also be countries with high education quality. Yet among the empirical regularities exposed herein, we show that this is not the case: The correlation between wages and education quality is only 35%.

The empirical analysis shows that while quality of education affects positively migration, wages do not affect positively migration. Previous research which have analyzed the impact of wages, did not include any variable for quality of education. So our paper shows that this is the element driving movement of students, and we have to admit that this result is quite intuitive.

This is not our main result. We have tried to test whether there is concentration in specific countries. The answer is clear: Young people travel to the top five countries in terms of education quality. Our indices show a concentration of students in the top-quality education countries, and not into countries with the highest wages, so that students' emigration is motivated by quality of education and not by wages.

Nobel Prize Laureate Robert Lucas raised a famous query in his paper: "Why doesn't capital flow from rich to poor countries?" Paraphrasing Lucas, we could state that human capital doesn't flow from poor to rich countries, but rather from countries of low-quality education to those of high-quality education.

These are not good news for the Bologna Process. These are even worse news for developing countries in the border of the European Union, especially for the Mediterranean countries. Young people will try to acquire higher education in the top countries in terms of quality of education, and brain drain will increase.

However there are also some good news. In order to develop, countries need bright people at the helm of the political and economic leadership. Countries do not

develop if their elite are not well educated. The Bologna Process leads to low tuition fees for all countries in the area. So the bright people from developing countries in which higher education is not of high quality can move and attend the best universities. Yet, will they return to their home countries?

Some other good news is that the market for education is much more open and competitive than that for labor. The literature has stressed the lack of mobility in the European labor market. This paper shows that the Bologna process has succeeded in stimulating mobility. Is this good for Europe? The answer is mitigated. The Bologna process is leading to significant changes, not only in the market for education, but also in the labor market. The effects on the neighborhood countries are not clear. On one hand, it can lead to an increase in the loss of young bright people. On the other hand, it could enable providing a good education to the next generation of leaders. The new literature on migration has emphasized that migration of young people can lead to multiple equilibria: Either there are some forces which will lead the young people to return to their countries of origin, be a source of economic growth, and become the next elite. Or, if there is no exogenous shock leading to this optimistic possibility, the flow of young people will increase and the home country can be caught in a vicious circle leading to some form of poverty trap.

In conclusion, this paper has shown that migration of students has to become a subject of research not less important than migration of workers related to the issue of social mobility. The usual brain drain will give place to migration of students. In consequence, the subject of the inequality of the quality of universities between countries is a main variable which will affect economic growth and social mobility.

References

Ahn, N., De la Rica, S. and A. Ugidos. 1999. "Willingness to Move for Work and Unemployment Duration in Spain", *Economica*, 66(263): 335-357.

Agasisti, T. and A. Dal Bianco. 2007. "Determinants of College Student Migration in Italy: Empirical Evidence from a Gravity Approach", Working Paper series.

Akerlof, GA and R. Kranton. 2010. *Identity Economics*. Princeton University Press

Altbach, P.G. 1998. "*Comparative Higher Education: Knowledge, the University, and Development"*, Ablex Publishing.

Altbach, P.G. and J. Knight 2007 The Internationalization of Higher Education: Motivations and Realities Journal of studies in Interantional Education

Bartel, A.P. 1979. "The Migration Decision: What Role Does Job Mobility Play?", *The American Economic Review*, 69 (5): 775-786.

Baryla, E.A. and D. Dotterweich. 2001. Student Migration: Do Significant Factors Vary by Region?", *Education Economics*, 9 (3): 269–279.

Beine, M., Docquier, D. and H. Rapoport. 2001. "Brain Drain and Economic Growth: Theory and Evidence", *Journal of Development Economics*. 64: 275-289.

Beine, M., Docquier, D. and H. Rapoport. 2008. "Brain Drain and Human Capital Formation in Developing Countries: Winners and Losers", *The Economic Journal*, 118: 631-652.

Benelux Bologna Secretariat. http://www.ond.vlaanderen.be/hogeronderwijs/bologna

Benassy, JP and E.S. Brezis. 2012. "Brain Drain and Development Traps", *Journal of Development Economics*, forthcoming.

Bessey, D. 2006. "International Student Migration to Germany ",University of Zurich, Institute for Strategy and Business Economics, Economics of Education Working Paper Series, n. 6.

Bhugra, D. 2004. "Migration distress and cultural identity", *British Medical Bulletin,* 69: 129-141.

Borjas, G.J. 1987. "Self-Selection and the Earnings of Immigrant", *The American Economic Review,* 77(4): 531-553.

Borjas, G.J. 1989. "Economic Theory and International Migration", *International Migration Review,* 23 (3): 457-485

Borjas, G.J. 1999. "Immigration and Welfare Magnets", *Journal of Labor Economics,* 17(4): 607-637.

Bowles, S. 1970. "Migration as Investment: Empirical Tests of the Human Investment Approach to Geographical Mobility", *The Review of Economics and Statistics*, 52 (4): 356-362

Brezis E.S and P. Krugman. 1996. "Immigration, Investment and Real Wages" *Journal of Population Economics*, vol. 9: 83-93.

Brezis E.S. 2008. "The Effects of Globalization on Social Mobility: the Emergence of a Transnational Oligarchy" UN working papers.

Brezis E.S. 2012. "Why are US Universities at the top of the International Rankings?" in J. Brada, W. Bienkowski and G. Stanley, eds. *The University in the age of Globalization,* Palgrave Macmillan pp. 155-179.

Card, D. and A. Krueger. 1992. "Does School Quality Matter? Returns to Education and the Characteristics of Public Schools in the United States" *Journal of Political Economy,* 100: 1-40.

CESifo. 2005. "Tuition Fees in Europe", CESifo Dice Report: Journal for Institutional Comparison, 3(2): 55-57.

CESifo. 2007. "Tuition Fees in Europe", CESifo Dice Report: Journal for Institutional Comparison, 5(4): 56-58.

Chiswick, B.R. 1999. "Are Immigrants Favorably Self-Selected?", *The American Economic Review*, 89 (2): 181-185.

De la Croix, D. and Docquier, F. 2012. Do brain drain and poverty result from coordination failures?. *Journal of Economic Growth* 17, 1-26.

Docquier, F. 2006. "Brain drain and inequality across nations", IZA Discussion Paper No. 2440.

Docquier, F., Rapoport, H., 2008. The brain drain, in the *New Palgrave Dictionary of Economics*, second edition, Macmillan.

Docquier, F., Rapoport H., 2012. Globalization, brain drain and development. *Journal of Economic Literature* 50, 681-730.

Ehrenberg, R.G and R.S. Smith. 2002, *"Modern Labor Economics: Theory and Public Policy"*, Addison Wesley, Eighth edition.

Ernest George Ravenstein E.G. 1889. "The Laws of Migration." *Journal of the Royal Statistical Society*, Vol. 52, No. 2. (June, 1889), pp. 241-305.

Gleditsch, K.S and M.D. Ward. 2001. "Measuring Space: A Minimum Distance Database and Applications to International Studies," *Journal of Peace Research,* 38, 739-58.

Greenwood, M.G. 1969. "An Analysis of the Determinants of Geographic Labor Mobility in the United States", *The Review of Economics and Statistics,* 51 (2): 189-194

Gross, D.M. and N. Schmitt. 2003. "The Role of Cultural Clustering in Attracting New Immigrants". *Journal of Regional Science*, 43 (2): 295-318.

Grossman J.R. 1989, "*Land of hope: Chicago, Black southerners, and the Great Migration"*, University of Chicago Press.

Grubel, H. and A. Scott. 1966, "The International Flow of Human Capital", *American Economic Review*, 56 (2): 268-74.

Hansen, M. 1940. " *The Atlantic Migration"*, Harper&Row.

Hanushek and Wossman. 2007. "The Role of Education Quality in Economic Growth" IMF.

Haque, N. U and S. Kim. 1995, "Human Capital Flight: Impact of Migration on Income and Growth", IMF Staff Papers, 42(3): 577-607.

Harris, J. and M. Todaro. 1970. "Migration, Unemployment & Development: A Two-Sector Analysis". *American Economic Review*, 60(1):126-42.

Heaton, C. and D. Throsby. 1998."Benefit-Cost Analysis of Foreign Student Flows from Developing Countries: The Case of Postgraduate Education". *Economics of Education Review,* 17(2): 117-126.

ILO. 2001-2006. Laborsta. http://laborsta.ilo.org

Kaluzny. R.L. 1975. "Determinants of Household Migration: A Comparative Study by Race and Poverty Level". *The Review of Economics and Statistics*, 57 (3): 269-274.

Karemera, D., Iwuagwu Oguledo,V. and B. Davis. 2000. "A Gravity Model Analysis of International Migration to North America", *Applied Economics*, 32: 1745–1755..

Karras, G. and C. U. Chiswick. 1999. "Macroeconomic Determinants of Migration: The Case of Germany 1964 – 1988", *International Migration*, 37 (4): 657-677.

Krugman, P.R. and M. Obstfeld. 2005. " *International Economics Trade and Policy*", Seventh - edition, Addision-Wesley Publishing company.

Kwok, V. and H. Leland. 1982. "An Economic Model of the Brain Drain", *The American Economic Review, 72 (1): 91-100.*

Kyung, W. 1996. "In-Migration of College Students to the State of New York", *The Journal of Higher Education*, 67 (3) : 349-358.

Lee, S. and C.C Roseman. 1999. "Migration determinants and employment consequences of white and black families, 1985 – 1990", *Economic Geography* 75 (2): 109 – 133

Li, M. and M. Bray. 2007. "Cross-Border Flows of Students for Higher Education: Push-Pull Factors and Motivations of Mainland Chinese Students in Hong Kong and Macau", *Higher Education*, 53 (6): 791-818.

Lucas, R.B. 1988. "On the Mechanics of Economic Development", *Journal of Monetary Economics*, 22: 3-42.

Mak, J. and J.E.T. Moncur. 2001. "Interstate Migration of College Freshmen: An Economic Analysis". University of Hawaii at Manoa, Working Paper, 11-5.

McHugh, R. and J.N. Morgan. 1984. "The Determinants of Interstate Student Migration: a Place-to-Place Analysis". *Economics of Education Review*, 3 (4): 269–278.

Mechtenberg, L and R. Strausz. 2008. "The Bologna Process: How Student Mobility Affects Multi-Cultural Skills and Educational Quality", *International Tax and Public Finance,* 15(2): 109-130.

Narchal, R. 2007. "Migration: Destruction and Reconstruction of the Self", *E-journal of Applied Psychology*, 3 (1): 55-64.

OECD. 2003-2008. *Education at a Glance*, Paris. http://www.oecd.org

Papatsiba, V. 2005. "Political and Individual Rationales of Student Mobility: a Case Study of Erasmus and a French Regional Scheme for Studies Abroad", *European Journal of Education,* 40 (2): 173-188.

Poutvaara, P. 2004. "Public Education in an Integrated Europe. Studying to Migrate and Teaching to Stay", CESifo Working Paper, n. 1369.

Romer, P. 1990. "Endogenous Technological Change", *The Journal of Political Economy, 98 (5): S71-S102.*

Rosenzweig, M.R. 2006. "Global Wage Differences and International Student Flows," in Collins, Susan M. and Carol Graham, ed., Brookings Trade Forum 2006: *Global Labor Markets*, forthcoming.

Shanghai Jiao Tong University Institute of Higher Education. 2007. *"Academic ranking of world universities"*. http://www.arwu.org

Sjaastad, L. 1962. "The Cost and Returns of Human Migration", *The Journal of Political Economy,* 70 (5): 80-93.

Stark, O. 2004. "Rethinking the Brain Drain", *World Development*, 1: 15-22.

Stark, O., Helmenstein, C. and A. Prskawetz. 1997. "A Brain Gain with a Brain Drain", *Economics Letters*, 55: 227-234.

Stark, O., Helmenstein, C. and A. Prskawetz. 1998. "Human Capital Depletion, Human Capital Formation, and Migration: a Blessing or a "Curse"?", *Economics Letters*, 60: 363-367.

World Values Survey Association. 2000. http://www.worldvaluessurvey.org

Appendix A– proof of proposition 1

We have to check two different cases, either $w_F > w_S$ or the opposite.

1. $w_F > w_S$

    A.   Let us assume that $Q_F > Q_S$. Since $Q_F > Q_S$, under Condition 1, we get

that: $A_F \succ B_F$. In countries in which tuition fees are not very different as is the case

in the EU countries (public universities), then this always hold.

        C1: $P_S + \lambda w_F (Q_F^\alpha - Q_S^\alpha) > (F_F - F_S)$.

    B.   In the case that $Q_F < Q_S$, then there is no reason to learn overseas and we get

that $B_S \succ B_F$ under Condition 2.

        C2: $P_S > Q_S^\alpha \lambda (w_F - w_S)$

2. $w_S > w_F$

In this case, we always get $B_S \succ B_F$.

Appendix B– proof of proposition 2

The assumption is that $F_S = F_F$.

A. First let us prove that $B_S \succ B_F$

1. If $w_S > w_F$.

Then this is obvious.

2. If $w_F > w_S$

Under Condition II, we get that $B_S \succ B_F$.

B. Let us prove that A_S is sub-optimal by proving either $A_F \succ A_S$ or $B_S \geq A_S$.

1. If $w_F > w_S$.

Then we get that $A_F \succ A_S$.

2. If $w_S > w_F$

If $Q_F < Q_S$, then we get that $B_S \succ A_S$

If $Q_F > Q_S$, then under Condition III, we get that $B_S \succ A_S$.

$$\text{CIII:} \qquad P_S > \lambda w_S (Q_F^{\alpha} - Q_S^{\alpha}).$$

TABLE 1

EMIGRATION OF STUDENTS TO OECD and NON-OECD COUNTRIES IN 2008

To OECD countries	No. of emigrants	% from total students	To Non OECD countries	No. of emigrants	% from total students
Australia	9 777	0.87	Afghanistan	3 451	
Austria	12 043	4.23	Albania	21 762	
Belgium	11 179	2.78	Algeria	22 356	
Canada	44 185	3.11	Argentina	9 996	
Chile	6 909	0.86	Brazil	24 066	0.40
Czech Republic	10 109	2.58	Bulgaria	24 945	
Denmark	5 810	2.52	China	437 003	
Finland	8 001	2.58	Croatia	9 244	
France	62 264	2.88	Cyprus	26 259	
Germany	92 391	4.12	Egypt	8 313	
Greece	30 985	4.86	Hong Kong, China	34 210	
Hungary	7 735	1.87	India	173 114	
Iceland	3 625	21.80	Iran	25 264	
Ireland	18 483	10.35	Iraq	3 735	
Israel	9 789	3.01	Jordan	6 073	
Italy	41 577	2.06	Kuwait	4 357	
Japan	51 648	1.31	Latvia	3 642	
Korea	112 142	3.50	Lebanon	12 705	
Luxembourg	7 676	254.93	Morocco	48 868	
Mexico	26 657	1.02	Pakistan	27 609	
Netherlands	13 670	2.27	Palau	51	
New Zealand	4 152	1.70	Palestinian Authority	1 256	
Norway	13 373	6.29	Qatar	1 328	
Poland	38 033	1.76	Russian Federation	37 241	0.37
Portugal	14 561	3.86	Saudi Arabia	17 315	
Slovak Republic	26 995	11.76	Syrian Arab Republic	7 030	
Spain	24 658	1.38			
Sweden	14 942	3.67			
Switzerland	10 813	4.82			
Turkey	48 324	1.91			
United Kingdom	27 901	1.20			
United States	47 803	0.26			

Source: OECD education at glance 2010

TABLE 2

THE EFFECT OF SIMILARITY ON STUDENTS EMIGRATION

	2001	2002	2003	2004	2005	2006
	Rate of migration to European OECD countries with similar structure of higher education (%)					
Austria	81.34	82.10	81.04	85.55	84.60	84.53
Belgium	59.42	61.15	63.11	70.60	70.68	70.28
Czech	79.57	81.22	81.62	87.93	83.37	79.06
Denmark	57.03	59.87	60.06	65.23	63.63	63.93
Finland	65.57	67.64	69.29	75.57	76.37	75.54
France	55.79	57.02	57.62	67.81	68.71	69.05
Germany	58.26	59.61	61.97	69.61	71.69	73.96
Greece	56.68	55.84	53.08	54.67	53.94	52.76
Hungary	90.12	89.61	89.58	91.89	88.66	86.13
Iceland	12.77	12.96	12.65	12.85	12.27	12.01
Ireland	89.22	89.47	88.71	90.74	90.84	91.23
Italy	70.31	69.28	68.93	79.39	76.95	76.03
Luxembourg	86.95	88.15	87.52	87.36	87.99	88.19
Netherlands	64.83	66.22	66.64	72.14	59.90	70.63
Norway	51.47	52.43	54.63	55.63	59.00	60.61
Poland	6.71	6.99	7.33	6.12	10.19	16.41
Portugal	61.92	60.69	58.77	59.47	57.25	57.25
Slovakia	96.65	96.74	96.60	97.61	96.63	95.79
Spain	33.64	34.09	32.50	28.39	29.34	29.93
Sweden	50.94	51.21	53.01	57.07	56.84	57.73
Switzerland	73.66	74.83	76.67	74.78	76.53	75.10
UK	33.44	34.16	33.51	24.61	17.82	18.67

Source: Own calculation.

TABLE 3

REGRESSION RESULTS: DETERMINANTS OF STUDENTS EMIGRATION

Variable	Overall_panel	Square EU15	Overall_panel	Square EU15
Dependent variable: $Pmig$ - Probability of emigration from country S to country F				
Constant	-7.182035 (-60.24)	-6.435478 (-46.77)	-7.95478 (-73.18)	-6.244323 (-42.02)
$\Delta Quality$	1090795 (10.35)	.1303641 (9.73)	.1028747 (5.67)	.006896 (0.22)
$\Delta Wage$	-.0000999 (-4.61)	-.000155 (-3.31)	.0003671 (9.61)	.000042 (0.61)
ΔCu	-.1115142 (-3.00)	-.2533198 (-3.62)	-.1654175 (-4.12)	-.2716306 (-4.11)
$\Delta Tuition$	.0006905 (13.22)	.0007624 (8.25)	.0006239 (10.24)	.0011574 (9.21)
$\Delta Tuitionsq$	2.94e-07 (6.85)	4.23e-07 (5.40)	-7.26e-08 (-1.57)	-1.57e-07 (-2.19)
EU_F	.4820245 (4.34)	------------	1.02883 (14.39)	------------
Distance	-.0014917 (-20.54)	-.0011801 (-9.13)	-.0014072 (-18.90)	-.0015966 (-13.06)
Similarity	-.0560596 (-1.08)	.0369502 (0.41)	.0221401 (0.39)	.0580827 (0.68)
Language	1.75015 (14.58)	1.929312 (11.99)	1.455952 (11.23)	1.315127 (8.95)
Top5-quality	------------	------------	1.4821480 (13.49)	2.243006 (10.59)
Wage5	------------	------------	-.4348655 (-4.24)	-.5718809 (-4.15)
R^2	0.3194	0.4603	0.4303	0.5421
Obs	3030	1131	3030	1131

Note: t-values are in parenthesis.

TABLE 4

CORRELATION BETWEEN WAGES AND QUALITY OF HIGHER EDUCATION

	Top100	Top200	Top500
Average wage	0.34	0.37	0.33

Sources: Shanghai Jiao Tong University, World university ranking, 2007, and International Labor Organization, 2001-2006.

TABLE 5A

CONCENTRATION EFFECT – PERCENTAGE OF MIGRANTS BETWEEN LOW AND HIGH QUALITY GROUPS

	Low to Low	Low to High	High to Low	High to High
2001	19	48	14	19
2002	19	48	14	19
2003	19	47	15	19
2004	18	49	14	19
2005	19	47	15	19
2006	20	45	17	18

Source: Own calculation.

Notes: "High" represents the top 5 countries according to the quality index of the top 100. According to this index the top 5 countries are France, Germany, Sweden, Switzerland and United Kingdom. "Low" represents all the other countries.

TABLE 5B

CONCENTRATION EFFECT – PERCENTAGE OF MIGRANTS BETWEEN LOW AND HIGH
WAGES GROUPS

	Low to Low	Low to High	High to Low	High to High
2001	73	15	11	1
2002	73	15	11	1
2003	74	15	10	1
2004	72	16	11	1
2005	71	18	9	2
2006	70	19	10	1

Source: Own calculation.

Notes: "High" represents the top 5 countries in wages. The top 5 countries are Austria, Denmark, Netherlands, Norway and Switzerland. "Low" represents all the other countries.

APPENDIX TABLE 1

MEMBERS OF THE "EUROPEAN HIGHER EDUCATION AREA"

Albania	Latvia
Andorra	Liechtenstein
Armenia	Lithuania
Austria	Luxembourg
Azerbaijan	Malta
Belgium	Moldova
Bosnia and Herzegovina	Montenegro
Bulgaria	Netherlands
Croatia	Norway
Cyprus	Poland
Czech Republic	Portugal
Denmark	Romania
Estonia	Russian Federation
Finland	Serbia
France	Slovak Republic
Georgia	Slovenia
Germany	Spain
Greece	Sweden
The Holy See	Switzerland
Hungary	Former Yugoslav Republic of Macedonia
Iceland	Turkey
Ireland	Ukraine
Italy	United Kingdom
Kazakhstan	

Source: *Bologna Process. http://www.ond.vlaanderen.be/hogeronderwijs/bologna/aboutthiswebsite*