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**Higher education: Time for coordination on a  
European level?**

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The responsibility for the contents of this CPB Discussion Paper remains with the author(s)

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## Abstract in English

Education has always been regarded as a national matter. According to the subsidiarity principle power may only be shifted to a higher level of coordination when solid arguments exist that this will improve welfare. This paper aims at answering the question if these arguments exist. We find no support for economies of scale, i.e. larger countries do not necessarily provide higher quality education; nor do larger schools. Empirical evidence for human capital externalities through student mobility is scarce. Concluding, we find little support for European coordination of higher education. However, there is evidence that student mobility is a precursor for labour migration. Uniformizing the structure of higher education in the EU, and making educational programs more transparent, may therefore be defended from this perspective. Quality does matter for students, and student mobility is increasing. This may be beneficial to labour mobility.

*Key words: Subsidiarity, European coordination, Higher education, Student migration*

*JEL code: F22, H87, I2, J61*

## Abstract in Dutch

Het in Europa heersende subsidiariteitsprincipe stelt dat Europese coördinatie van het hoger onderwijs alleen zin heeft als er gegronde argumenten zijn dat dat welvaartsverhogend werkt. Dit paper onderzoekt of die argumenten bestaan. Schaalvoordelen blijken in het hoger onderwijs geen belangrijke rol te spelen: grotere landen of grotere onderwijsinstellingen leveren niet noodzakelijkerwijs een hogere kwaliteit onderwijs. We vinden weinig empirisch bewijs voor het bestaan van externe effecten. Wel vinden we een indicatie dat studentenmobiliteit leidt tot meer arbeidsmobiliteit. Daardoor kan Europese samenwerking op het gebied van hoger onderwijs - zoals de invoering van het Bachelor-Masterstelsel - op termijn voordelen met zich meebrengen. Door informatie voor studenten transparanter te maken en studieprogramma's beter vergelijkbaar, kunnen studenten beter gefundeerde keuzes maken. Dit kan gunstige gevolgen hebben voor studentenmobiliteit en daaropvolgende arbeidsmobiliteit.

*Steekwoorden: Subsidiariteit, Europese Unie, Hoger onderwijs, Internationale studentenmobiliteit*

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## Summary

Higher education is at the front of the policy debate in the European Union. The number of students studying abroad has risen rapidly over the past decades. The forces of internationalisation increase competitive pressures and inspire discussions about the optimal design of higher education policy in Europe. One of the questions raised is whether education policies should be left to the individual member states or whether European coordination is desirable. This paper discusses the possible arguments for coordination at a European level and assesses their empirical relevance.

Education has always been regarded as a national matter. For higher education, this relation is weakening due to increased student mobility, stimulated by both increasing demand and pro-competitive response of universities and other educational suppliers. An important step towards European coordination has been made with the Bologna treaty, which up to now has been ratified by the 25 members of the European Union and 20 non-EU countries. It entails the uniformization of the structure of higher educational programs, and enables better comparison and exchangeability of programs. Nevertheless, differences in higher education in EU-members remain, for instance regarding tuition fees and quality.

The question arises if recent developments in higher education might justify lifting coordination of higher education to a higher level, i.e. from a national to a European level. In the European Union the choice of the appropriate level of coordination is based on the subsidiarity principle. The subsidiarity principle states that power may only be shifted to a higher level of coordination when the objectives can, “by reason of the scale or effects of the proposed action, be better achieved by the Community”. Testing for the appropriate level of coordination therefore implies identifying possible advantages of centralisation, assessing their importance and weighing them against the associated costs.

The possible advantages of centralisation can be grouped in two broad categories: economies of scale and external effects. The proponents of European coordination claim that economies of scale in higher education can lead to a higher quality level due to increased competition and that the transfer of knowledge across borders by students studying abroad brings along substantial external effects. Before discussing the relevance of these economies of scale and external effects in more detail, it is important to note that those benefits will only materialise if students are sufficiently mobile. If this condition is not met, human capital spillovers will not occur and competition between universities will not get off the ground. The latter also is true if students don't care about the quality of education at the foreign institutes.

Student mobility is crucial for reaping the potential benefits of European coordination. The percentage of students studying abroad has increased rapidly over the past decades, but is still well below the policy target of 10%. To gain some insight in the motivation behind their choices, we first consider some surveys referring to both students who go abroad temporarily, respectively students who take up an entire educational program abroad. The cultural

experience is often the major reason for studying abroad a few months. However, for students who enrol as regular students in a foreign university, the availability of the educational subject is often the deciding motive. In addition, the quality of education is also an important factor to them.

We explore the determinants of student mobility further by means of an econometric regression analysis. The regression results show that students, just like regular migrants, prefer to go to countries with a higher GDP per capita and a lower unemployment rate. Furthermore, tuition fees do not seem to have an important impact on the student flow. Two important conclusions can be drawn from the regression analysis. First, we find that the quality of education is important for students engaged in an entire study-program abroad in their choice to study abroad. Second, distance, both physical and religious distance, has a significant discouraging effect on student mobility. It seems safe to conclude that students prefer to study close to their parents' home.

The finding that students seem to base their choice for a school to some extent on its educational quality is an important one. If economies of scale exist in the field of higher education, competition through these economies of scale may increase educational quality. However, our empirical analysis shows that there is hardly any evidence for the existence of economies of scale. Larger countries within the EU do not provide higher educational quality than smaller ones, and also larger schools are not found to offer higher quality education. The quality of higher education institutes is highly correlated with the degree of selectivity applied. This relationship seems to play a more important role in explaining why educational institutions are able to offer a certain level of educational quality.

Cross-border externalities form the other theoretical motive for lifting coordination of higher education to a higher - i.e. European - level. Empirical evidence for externalities is also rather scarce: direct human capital spillovers through mobile students are difficult to estimate. In addition, it remains ambiguous whether the host country or the country of citizenship will benefit. This depends on the educational quality in both countries and whether or not the student returns to his country of citizenship or not.

Indirect human capital spillovers may be more important. They may materialise through labour mobility among the high-skilled or through the effects of human capital on R&D. We conclude that as both student and labour mobility in the EU is quite low, the expected effects from externalities seem small as well. However, some minor coordination initiatives, like enhancing transparency and improving the comparability of university degrees throughout Europe, could be supported by the existence of these cross-border externalities. Concluding, we find little support for further centralisation of higher education.



# 1 Introduction

Education has always been, and still is, regarded as a national matter. For primary and secondary education in the European Union, local authorities are in power. For higher education, this has always been so, but lately, this relation is weakening due to increased student mobility, stimulated by both increasing demand and pro-competitive response of universities and other educational suppliers (Pelkmans, 2005). Moreover, the Bologna treaty, which up to now has been ratified by the 25 members of the European Union and 20 non-EU countries, entails the introduction of the dual Bachelor-Mastersystem (see box). The BaMa-system uniformizes the structure of higher educational programs, and enables better comparison and exchangeability of programs. Nevertheless, differences in higher education in EU-members remain, for instance regarding tuition fees and quality.

The question arises if recent developments in higher education might justify lifting coordination of higher education to a higher level, i.e. from a national to an European level. European coordination exists in different forms, from top-down governance to voluntary cooperation between the EU member states (the so-called method of open coordination). As far as higher education is concerned, European coordination can imply coordination of financial matters regarding higher education (funding, tuition fees), but could also include making educational programs within the EU more transparent and comparable in structure or quality, to uniformize admission criteria, and so on.

In the European Union, the choice of the appropriate level of coordination is based on the subsidiarity principle (art. 5, EC). The subsidiarity principle states that power may only be shifted to a higher level of coordination when the objectives can, “by reason of the scale or effects of the proposed action, be better achieved by the Community”. A functional subsidiarity test therefore starts by asking whether coordination is justified by the existence of economies of scale and/or externalities (Ederveen and Pelkmans, 2006). Scale economies in the field of higher education may possibly lead to a higher educational quality level or a lower price. Externalities can be subdivided into human capital spillovers caused by mobile students, and human capital spillovers caused by subsequent labour mobility. This paper aims at answering the question if these arguments exist, i.e. if higher education should be coordinated at a European level.

In order to benefit from economies of scale and externalities in higher education, if any, two important conditions should be met: students ought to be mobile, i.e. willing and able to study abroad, and should base their choice on educational quality. If the first condition is not met, externalities (human capital spillovers) will not occur; if the second condition is not met, student mobility will not lead to competition based on quality. In other words, if these conditions are not met, creating a single European market for higher education may not lead to more quality.

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## The onset of European coordination: The Bologna Declaration

In 1998, France, the UK, Italy and Germany signed the Sorbonne-declaration focusing on uniformizing the structure of higher education in those countries. This initiative was widely applauded by other European countries, and in 1999, the Bologna Declaration was signed by 29 countries. This treaty entailed the goal of creating a European area of higher education in order to enhance the employability and mobility of citizens and to increase the international competitiveness of European higher education. The European space for higher education should be completed in 2010. The measures that countries agreed to take to achieve this, are

- the adoption of a common framework of readable and comparable degrees;
- the introduction of undergraduate and postgraduate levels in all countries (BaMa-system), with first degrees no shorter than 3 years and relevant to the labour market;
- the introduction of ECTS-compatible credit systems;
- the introduction of a European dimension in quality assurance, with comparable criteria and methods;
- the elimination of remaining obstacles to the free mobility of students (as well as trainees and graduates)<sup>a</sup>.

In 2001 in Prague, the Bologna treaty was extended by noting the importance of permanent education (lifelong learning), a competitive and attractive supply of educational programs for non-EU students and teachers, and of student participation. In 2003 in Berlin, 7 more countries signed the Bologna-treaty, amounting their number to 40 in total. Last May, Bergen was hosting 45 ministers responsible for higher education in their country to discuss the Bologna process<sup>b</sup>. As for progress on the measures stated above, in 2005, the following was accomplished:

- just over half of the participating countries have the two-cycle degree system in place on a wide scale, and one fifth has it partly introduced;
- more than half of the participating countries have quality assurance structures in place. However, qualifications issued in accordance with the Bologna principles on the Bachelor level are not always taken well by employers;
- there are difficulties associated with recognition of foreign degrees, including the existence of a variety of validation procedures<sup>c</sup>.

<sup>a</sup> Source: The Bologna Declaration on the space for higher education, prepared by the Confederation of EU Rectors' Conferences and the Association of European Universities (CRE).

<sup>b</sup> Source: Nuffic, 2004, Bison monitor internationale mobiliteit in het hoger onderwijs, p.15.

<sup>c</sup> Source: General Report of the Bologna Follow-up Group to the Conference of European Ministers Responsible for Higher Education, Bergen, 2005.

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Vanhaecht and Pauwels (2005) stress the relevance of these two conditions. They develop a formal model in which two universities compete in the quality of their teaching and in their admission policies. Students differ in their level of innate ability and in their original geographical location. If students value quality the most, then an equilibrium can occur in which the two universities offer a different quality level. However, if students experience mobility costs as severe barriers to mobility, they will have a strong preference for the university that is nearest to the place they are living in. In that case, quality levels and admission standards will be the same between both universities in equilibrium. Therefore, if mobility costs are prohibitive to students competition for quality will not materialise.

Chapters 2 and 3 study the mobility of students and their reasons to study abroad in more detail. Chapter 2 discusses surveys stating motives to go abroad of two types of students: those

who go abroad temporarily, and those who take up an entire educational program abroad. To get more insight in determinants of student mobility, chapter 3 performs an empirical analysis to determine the motivations of students to study in a particular country. From this analysis, we may extract several findings. Firstly, we may shed light on factors hampering student mobility. Secondly, we may find the importance of quality as a determinant of student mobility, i.e. find whether or not students base their choice to study at an institute in a particular country on the quality level of this institute or country or on different motives. We conclude that students do value quality, but that mobility costs also play an important role: students seem to have a strong preference for studying at a university that is located near the home of their parents.

Economies of scale may stimulate competition between higher education institutes and enhance educational quality. As quality seems to matter for the choice of students for their destination, economies of scale may provide a rationale for European coordination. Chapter 4 discusses these issues further and explores the empirical relevance of this argument. It concludes that economies of scale hardly play a role in explaining differences in quality, and that other mechanisms, like selection, are probably much more important in this respect.

Next to economies of scale, the existence of cross-border externalities may provide a justification for lifting coordination to a European level. With respect to higher education, different forms of possible cross-border externalities can be distinguished. First, there is the possibility that educational quality increases, both in the university at home and in the destination, when students study abroad for a limited period of time and return afterwards. Second, student mobility may act as a precursor for labour mobility. In this way the effects of education may also spill over to other countries. Chapter 5 discuss these theoretical motives for lifting coordination of higher education to a higher level, and summarise empirical findings on their existence. We conclude that as both student and labour mobility in the EU are quite low, the expected effects from externalities seem small as well. However, some European coordination initiatives, like enhancing the comparability of university degrees throughout Europe, could be supported by cross-border externalities.

Our main conclusions are summarised in chapter 6. It discusses the implications of our findings on the question of subsidiarity concerning higher education and it discusses the potential of the Bologna agreement.



## 2 Student mobility: developments and determinants

International student mobility is an increasingly important phenomenon. King and Ruiz-Gelices (2003) report that 1.6 million tertiary-level students all over the world were studying abroad in 1996. This is a rise of almost 20% compared with five years earlier. Half of these international students was studying in Europe, while a third had the European nationality. Especially Austria and the United Kingdom host a lot of students compared to their population.

Most European international students study in another European country. Stimulated by the EU-financed ERASMUS and Socrates programmes, international student mobility within Europe has increased rapidly over the past decades. In 1987/1988 only a little over three thousand students within the EEA<sup>1</sup> went to another (candidate)EU/EEA-country for a limited period of time on an ERASMUS-scholarship. In 2003/2004, their number has risen to almost 136 thousand (European Commission, 2005a). Notwithstanding the huge increase, the number of mobile students has remained well below the European Commission's target of 10%. King and Ruiz-Gelices (2003) mention questions of cost, motivation and organisation as possible reasons why student mobility has fallen short of expectations. According to the Cheers survey, considering both foreign education and foreign work experience, about 20% of the students has gained some foreign experience during their study (Van Loo and Cörvers, 2003).

Students may have different motives to study abroad. These reasons will depend on the length of time they spend abroad, which stage of their education they are in, and so on. In this section, we discuss why students go abroad to study. We distinguish two groups: students who go abroad for a limited period of time and who are often already enrolled in an educational program in their country of citizenship (credit mobility), and students who enrol in an educational program abroad (diploma mobility). The latter group will pay the tuition fees and obtain a diploma of the educational institute in the foreign country; the former group mostly will pay tuition and receive a diploma of their home institution.

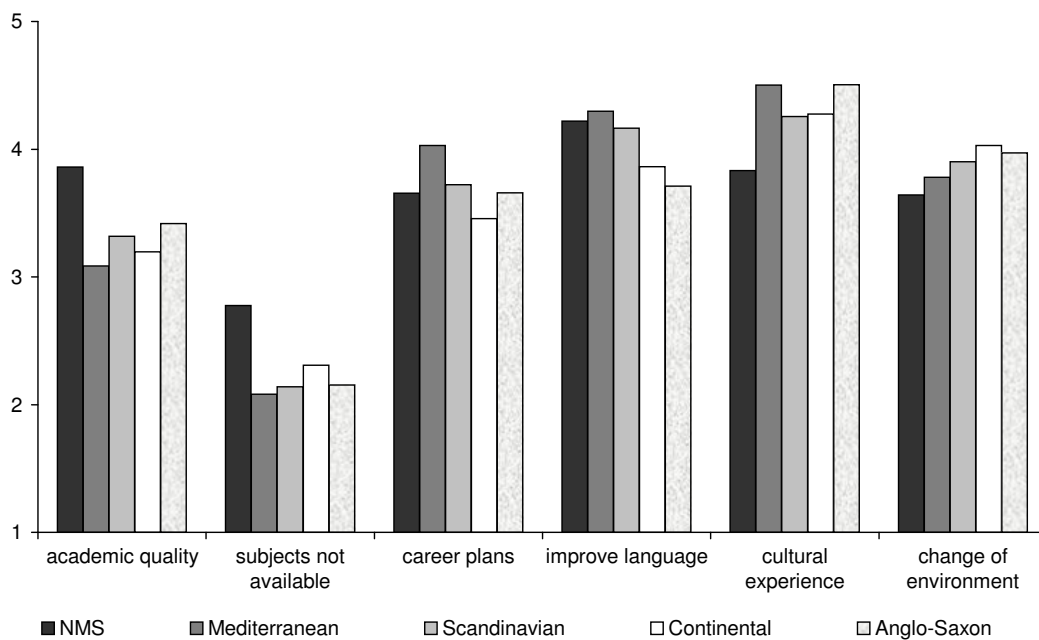
### 2.1 Temporarily abroad: ERASMUS exchange

In 1987, the European Union introduced the ERASMUS program to 'enhance the quality and reinforce the European dimension of higher education by encouraging cooperation between universities, boosting European mobility and improving the transparency and full academic recognition of studies and qualifications throughout the Union'. All 25 EU-members, three EEA-countries (Iceland, Liechtenstein and Norway), and three candidate countries (Bulgaria, Romania and Turkey), participate in the ERASMUS program. Students enrolled in an educational program in one of these members may study in another member country for 3 to 12 months and receive a grant per month during that period. Currently, almost 2200 higher education institutions participate in ERASMUS. Since the creation of ERASMUS, 1.2 million

<sup>1</sup> EEA = European Economic Area, including Iceland, Norway, and Liechtenstein, as well as the EU-countries.

students have studied abroad under this program (European Commission, 2005a). The United Kingdom is the most popular destination country, followed by the other big countries France, Spain, Germany and Italy. When looking at the balance of the number of incoming and outgoing students, the United Kingdom and Ireland stand out. They receive almost twice as many students as they send out. The fact that in both countries English is the official language may be a factor in explaining their attractiveness (Jennissen, 1999). In contrast, the southern European countries send out many more students than they receive.

**Figure 2.1 Motivation of ERASMUS students to go abroad**



Source: Integrated Reporting for International Students (IRIS). Based on surveying 4641 ERASMUS-students. The survey question read: 'What was the importance of the following factors in your decision to study abroad?' Scores from 1 (not important) to 5 (very important). Countries are subdivided in NMS = New Member States; Mediterranean; Scandinavian countries; Continental (Belgium, the Netherlands, Germany, Austria, and France); Anglo-Saxon (Ireland and the UK).

Figure 2.1 depicts the motivations of ERASMUS students to study abroad, based on over 4600 surveys. All students, except for the students from the new member states (NMS), rate 'Cultural experience' highest. Students from the NMS aim at improving their language skills and find academic quality to be important. Academic quality does not seem to be an issue for other students in their choice to study abroad, and the availability of specific subjects is discarded by all students.

These findings are consistent with other survey results. From their study of groups of University of Sussex students who had spent a year abroad (YA) as part of their Sussex degree, King and Ruiz-Gelices (2003, p.237) conclude: "Summing up it seems, both from our survey results and those of others, that students and graduates see the YA retrospectively (and to a

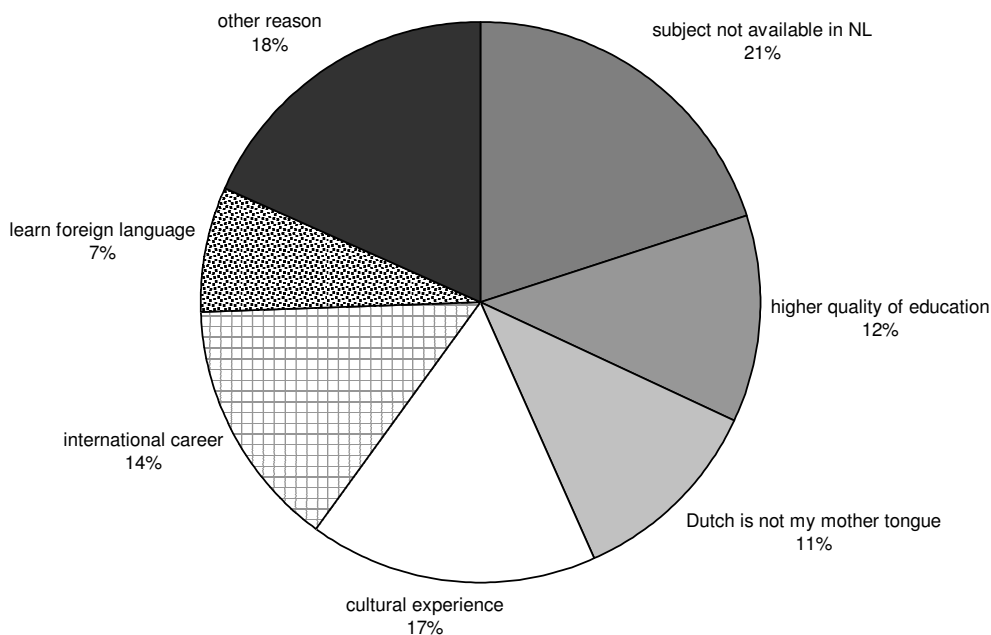
large extent prospectively) mainly in linguistic and cultural terms rather than in terms of its academic value.”

The fact that these students do not obtain a diploma of the institution they visit may reduce the incentive to choose a high quality school. Moreover, the length of their exchange may be too short to attach a high weight to the quality of the university they visit. The next section considers students who spend their whole study abroad.

## 2.2 Permanently abroad: VISIE scholarship

To examine whether the quality of education is an important determinant of international student mobility, looking at students who enrol as regular students and obtain a diploma of a foreign institution is of more interest. Permanently studying abroad is much less popular than studying temporarily abroad. We look at a small sample (126) of surveyed Dutch students who enrolled in a bachelor program abroad within a year after they graduated from secondary school. They all applied for a VISIE-scholarship, a grant of approximately EUR 300 per month during the entire program, issued by the Dutch government during 1998-2002. The purpose of the scholarship was to promote student mobility within the EU, Norway, Iceland and Liechtenstein<sup>2</sup>.

Figure 2.2 Motivations of VISIE students to go abroad



Source: Nuffic, 2000. In the survey, students can only choose one option when answering the question: 'What was the decisive reason to study abroad?' Sample consists of 126 surveys.

<sup>2</sup> The possibility that the Dutch students would not return to the Netherlands after finishing their studies was not taken into account in the motivation of introducing the VISIE-scholarship. No information is available on the actual number of VISIE-students returning to the Netherlands (Nuffic, personal communication).

These students are younger than students in the Master-phase of their education, since these students go abroad within a year after graduating high school (i.e. about 18 years old). Their young age may make the choice to live on their own abroad more difficult. The average VISIE-student has the Dutch nationality, aims at studying abroad in the UK, and about half of the VISIE-students wants to study Arts, Business, or Social Sciences.

It is clearly visible in Figure 2.2 that VISIE-students have different reasons to study abroad than ERASMUS-students. The reason for studying abroad that is mentioned most is that the educational subject was not available in The Netherlands. Over one fifth calls this the deciding factor to study abroad. This is in sharp contrast with the motives for studying temporarily abroad with the ERASMUS program. For both programs the cultural experience and career perspectives are important. However, more than 80% of the VISIE-students who started the study abroad because of the cultural experience involved did not finish the study. It is not surprising that the quality of the education was no issue for this group of students. For the students who continued studying after the first year, quality does seem to matter for their choice of a complete study abroad as well: more than 20% of these students state the higher quality of education relative to quality in the Netherlands as the main reason in deciding to study abroad. When more options could be marked, the language spoken in the destination country is most often mentioned as an important reason for choosing a specific country (by 70% of the VISIE-students), followed by the quality of education, what is mentioned by almost half of the students. About 30% states culture, distance or specific subject/educational program as an important factor. The latter findings fit to the literature. With a reference to Litten (1991), Winston (1999) states that students in the US do not prefer being far away from home. Rose-Ackerman (1996) finds that students rate curriculum and ideological aspect of a school as important. Tuition or costs of living abroad don't seem to be an important barrier for these students; 86% of the students says (s)he had pursued study plans without the scholarship.

Summarising, the number of students studying abroad has increased rapidly over the past decades, especially those studying 3-12 months abroad. Still, the total number is well below the 10% target. The information from different surveys gives some first insights in the determinants of student mobility. The cultural experience is often the major reason for studying abroad temporarily. However, for students who enrol as regular students in a foreign university, the motivation is different. For them, the availability of the educational subject is often the deciding motive. In addition, the quality of education is also an important factor to them. The next chapter explores the determinants of student mobility further by means of an econometric regression analysis.



### 3 Regression analysis: exploring the determinants of student mobility

In order to benefit from economies of scale and human capital spillovers (if any), two important conditions should be met: students ought to be mobile, i.e. willing and able to study abroad, and should make their choice based on quality. If these conditions are not met, one European market for higher education will not trigger enhanced quality through more competition due to student demand.

The previous chapter has provided some evidence on the importance of quality and mobility costs for the choice to study abroad. In this chapter, we perform an empirical analysis to determine the determinants of students studying abroad. From this analysis, we may extract

- factors hampering student mobility;
- if quality is an important determinant for student mobility, i.e. do students base their choice to study at an institute in a particular country on the quality level of this institute/country?

#### 3.1 Gravity equation

We will use a gravity equation to estimate the determinants of student mobility. Since Tinbergen (1962) and Linneman (1966) argued the gravity equation used in physics could also be applied in economics to explain trade flows or migration flows, many studies have used this equation to do so. We are not aware of any studies using this equation to explain student mobility. In the gravity equation, (trade or migration) flows are expected to depend negatively on distance (proxying transport costs) and positively on the size of the economy measured by GDP, or in case of people flows, measured by population. In some studies, GDP per capita or unemployment is also included in the specification to account for the economic environment in a specific country.

The specification of the gravity equation we use looks as follows:

$$\begin{aligned} \ln ENROL_{ij} = & \beta_0 + \beta_1 \ln POP_i + \beta_2 \ln POP_j + \beta_3 \ln GDP_i + \beta_4 \ln GDP_j \\ & + \beta_5 UNEMP_i + \beta_6 UNEMP_j + \beta_7 \ln DQUAL_{ij} + \beta_8 \ln DTUIT_{ij} + \\ & + \beta_9 LAN_{ij} + \beta_{10} REL_{ij} + \beta_{11} CULT_{ij} + \beta_{12} \ln DIST_{ij} + \varepsilon_{ij} \end{aligned} \quad (3.1)$$

Where

$ENROL_{ij}$  is the enrolment of students with citizenship of country  $i$  who are enrolled in a regular tertiary educational program in country  $j$ .

$POP_i, POP_j$  is population in country  $i$  (country of citizenship) or  $j$  (host country).

$GDP_i, GDP_j$  is GDP per capita in country  $i$  or  $j$ .

$UNEMP_i, UNEMP_j$	is the unemployment rate in country $i$ or $j$ .
$DQUAL_{ij}$	is the difference in quality between country $i$ and $j$ . For construction of the quality measure, we refer to Annex 1.
$DTUIT_{ij}$	is the difference in tuition paid in country $i$ and $j$ in euro's.
$LAN_{ij}$	is the linguistic distance between country $i$ and $j$ . This is a number between 0 and 1. A linguistic distance of zero refers to two countries sharing a language, a number close to one refers to countries with languages that bear little resemblance.
$REL_{ij}$	is the religious distance between country $i$ and $j$ . This is a number between 0 and 1 (very distinct religions).
$CULT_{ij}$	summarises the difference in cultural values in country $i$ and $j$ . Again, this is a number between 0 and 1 (large cultural diversity).
$DIS_{ij}$	is the physical distance between the capitals of two countries $i$ and $j$ .

The dependent variable gives the natural logarithm of the number of students with citizenship  $i$  enrolled in an entire educational program in country  $j$ . The population variables function as the mass variables in the gravity equation for migration flows. A higher population in either the country of citizenship or the host country is expected to have a positive effect on student mobility: if a country has more students it can be expected that the absolute number of students going abroad is larger as well.

GDP and unemployment are the familiar economic variables in any migration equation. When student migration is a precursor to labour migration<sup>3</sup>, student flows are expected to go from low-income to high-income countries. Furthermore, there may be a positive relationship between GDP per capita and educational quality in a country.<sup>4</sup> A higher GDP per capita in the host country could also influence student migration to that country positively since students are simply more willing to be in a country with a high GDP per capita level. Likewise, a higher GDP per capita in the country of citizenship may affect student migration negatively. On the other hand, people in a country with a high GDP per capita level have more to spend in general, and may use their resources to afford a study abroad.

Oppositely of the expected effects of GDP per capita, a higher unemployment rate in the country of citizenship is expected to have a positive effect on student migration, whereas a higher unemployment rate in the host country is expected to influence student migration negatively. A higher level of unemployment in a region discourages immigration into that region, since the risk of becoming unemployed is high (see Harris & Todaro, 1970).

We are especially interested in the effects of differences in quality and differences in tuition fees on international student migration. Do students go to countries where the quality of

<sup>3</sup> We will come back to this issue in section 5.2.

<sup>4</sup> Our analysis of scale effects in chapter 4 provides evidence for this relationship.

education is higher and tuition is lower? The strength of these effects can have important implications for the desirability of European coordination of higher education.

Our measure for quality of higher education in a country is based on the number of top universities located in that country.<sup>5</sup> We measure the relative quality by the ratio of quality in the host country and quality in the country of citizenship:  $DQUAL_{ij} = QUAL_j/QUAL_i$ . Taking (natural) logs gives  $\ln(DQUAL_{ij}) = \ln(QUAL_j) - \ln(QUAL_i)$ . A positive effect can be hypothesised, as a higher educational quality in the host country is expected to increase the student flow.

The difference in tuition is defined as tuition in the host country minus tuition in the country of citizenship, or  $DTUIT_{ij} = TUIT_j - TUIT_i$ <sup>6</sup>. In contrast to the expected effect of the difference in quality, a higher tuition in the host country  $j$  compared to tuition in the country of citizenship  $i$  is expected to decrease student flow to country  $j$ .

Finally, we include a number of distance variables in our regression model. These variables may shed more light on the mobility of European students: if distance is experienced as very prohibitive, student mobility can not be expected to increase easily.

A larger physical distance is expected to reduce enrolment abroad. For cultural distance, a positive effect can also be found, since the students in our sample may value the cultural experience as ERASMUS students indicated to do. The same applies to linguistic distance, although it seems a priori more likely that a very distinct language influences the flow negatively.

## 3.2 Data

Neither the ERASMUS sample nor the VISIE sample fits our purposes completely. The former dataset only includes students who went abroad for a limited period of time and might therefore have distinct reasons for their choice than students doing an entire study abroad (as was confirmed in the surveys discussed in the previous chapter). The latter dataset only includes a small sample of Dutch students.

We use the OECD Education Database on foreign students (OECD, 2004a). This dataset gives the number of students enrolled in another country for the years 1998-2002. The educational level in the dataset is tertiary education (ISCED5B - tertiary education, occupational programs; or ISCED5\_6 - total tertiary education: tertiary education including occupational programs, academic research programs (including PhD programs), European Commission, 1999).

Students are foreign students if they do not have the citizenship of the country for which the data are reported. Thus, foreign students are defined as people enrolled in a regular educational program in a particular country without having the citizenship of that country. This dataset has

<sup>5</sup> This measure is discussed further in chapter 4, while a detailed description of its components can be found in Annex I.

<sup>6</sup> As tuition fees are zero for a number of countries, we use the absolute difference instead of the relative difference.

multiple advantages. Firstly, this dataset gives the citizenship of the student as well as the country where the student follows his/her education. Secondly, it only includes students enrolled in a full program, i.e. students on an exchange-program of limited duration are not included. The latter group may decide to go study abroad for very different reasons; they will obtain a degree from their home institution. The reputation of the educational quality of their home institution will be attached to this degree. Therefore, their incentive to choose an institution with higher educational quality on their study exchange might be lower than for students who pursue their entire educational career abroad. Their diploma will be judged on the reputation of the institution abroad. Thirdly, differences in tuition are no disturbing factor. Since the students in the sample are regular students enrolled in the entire study program, they pay the same tuition as their fellow students with the nationality of the country they study in. However, foreign students may not be eligible to exactly the same scholarships as nationals<sup>7</sup>. Fourthly, border students, i.e. students living in Germany but enrolled in a Dutch university, are also included in these data whereas this group causes distortion in most datasets on student mobility. In the example mentioned, students holding German citizenship will be included as a foreign student in our sample.

A disadvantage of the dataset is related to the definition of the foreign students. Immigrants, who have lived in the country they migrated to for years but didn't acquire the citizenship of that country, are also included. However, the percentage of this group pursuing an educational career at tertiary level is not that large<sup>8</sup>. Unfortunately, a distinction between academic programs at Master-level and PhD-level cannot be made.

Our interest is in student mobility in Europe. We include the fifteen old member states of the European Union<sup>9</sup>, Switzerland, Norway and two new member states (Poland and Hungary). Because of lack of data on cultural values in Poland and Hungary, missing cultural data on Italy, and missing quality-data on Luxembourg, these countries are effectively omitted.

Data for GDP per capita, unemployment rates and population are provided by OECD. Data on tuition are taken from CHEPS for all countries except Switzerland, France, Greece, and Spain, where the European Commission provided data (CHEPS, 2004; European Commission, 2005b). Tuition covers tuition expenses for regular tertiary educational programs, excluding Ph.D-programs and specific programs such as MBA's. It is advantageous that we are dealing with intra-EU mobility, which makes it unnecessary to take into account the often largely distinct tuition fees for non-EU and EU-students. Data to construct the quality measure are provided by the Institute of Higher Education of Shanghai Jiao Tong University<sup>10</sup>. Cultural distance

<sup>7</sup> The recent verdict by the Luxembourg High Court in the Bidar-case might change this.

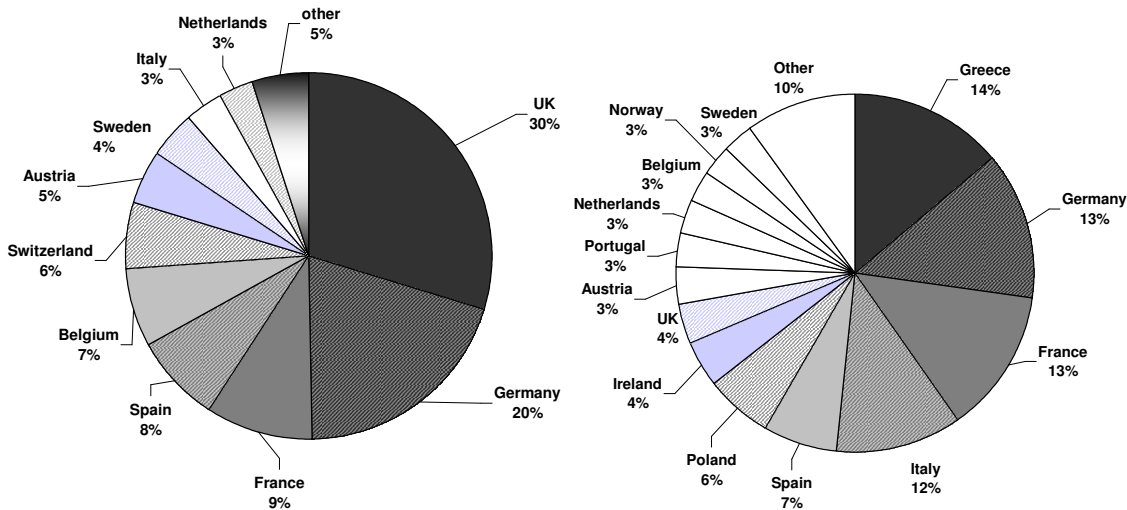
<sup>8</sup> In the Netherlands, the percentage of non-Dutch ('allochtone') students pursuing a full-time educational program at vocational ('HBO') or university level as a percentage of all full-time students was about 15%.

<sup>9</sup> Austria, Belgium, Denmark, France, Finland, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.

<sup>10</sup> The construction and some limitations of this measure will be discussed further in the next chapter.

indicators are provided by Belot & Ederveen (2006, forthcoming) and calculated on the basis of Inglehart's cultural dimensions (Inglehart and Baker, 2000); indicators measuring religious distance and language distance were also provided by Belot & Ederveen (2006, forthcoming). (Physical) distance measures were available from CEPII's distance database (Gaulier et al, 2003).

**Figure 3.1 Countries hosting most foreign students as a percentage of all foreign students in our sample, 2002 (left), and countries sending most students to other EU-countries in our sample, 2002**



Source: OECD, 2004. Our 2002 sample includes 325843 students.

Left: The category 'other' includes Denmark, Ireland, Norway, and Finland (each hosting about 1% of total students), and Hungary (0.5%), Poland (0.3%), Greece (0.03%). Luxembourg and Portugal hosted no students in 2002.

Right: The category 'other' includes Finland, Hungary, Switzerland, Luxembourg, and Denmark (2% of the students in our sample have these citizenships).

To get more insight into our data sample, Figure 3.1 shows the favourite hosting and 'sending' countries in our sample in 2002. Please note that our sample includes EU-countries only.

Analysis of the data reveals the UK and Germany are favourite destinations among students (Figure 3.1, left figure). In 2002, UK and Germany hosted half of the students in our sample. The right figure reveals that most students in our sample (in 2002) are Greek, German, French or Italian. This is not surprising, since our dataset contains absolute numbers of students, and larger countries simply have more students. When we correct for the total number of students enrolled in the countries, we find what countries host and 'send out' relatively most students (Table 3.1). For example, in 2002, 11% of all students in Switzerland held citizenship from another EU-country whereas only 2% of all students with Swiss citizenship studied in another EU-country.

**Table 3.1** Number of students hosted and sent out relative to total students enrolled

	Foreign (European) students in a country as a percentage of all students enrolled in that country	Students with .. citizenship enrolled in another European country as a percentage of all students holding that citizenship
Switzerland	11.0	2.0
Austria	7.0	2.5
Belgium	6.2	2.0
UK	4.3	3.5
Sweden	3.5	4.6
Germany	3.0	1.2
Ireland	2.3	2.3
Denmark	2.2	7.2
Netherlands	1.9	2.0
Norway	1.8	1.8
France	1.5	2.5
Spain	1.4	0.5
Finland	0.6	4.5
Italy	0.6	2.7
Hungary	0.5	1.7
Poland	0	1.0
Greece	0	7.9
Portugal	0	2.5
Luxembourg	0	66.9

The countries hosting most students from other EU-countries relative to the total number of students in that country are Switzerland, Austria, Belgium and the UK. Hungary, Poland, Greece, Portugal and Luxembourg hosted least students. Relatively many Luxembourgers, Greek, Danes, Finns, and Swedes went to study in an EU-country in our sample in 2002. According to our quality measure, Switzerland and the Scandinavian countries have the highest quality, followed by Ireland, Austria, the Netherlands and the UK. The quality level in the new EU member states and Spain, Portugal and Greece, is lowest. Our empirical results in the next section will shed more light on the relationship between student mobility and quality.

### 3.3 Estimation results

In the econometric method dealing with our bilateral data, we follow Kox et al (2004). They perform OLS regressions with and without fixed effects for the origin and destination countries using a gravity equation to attempt to explain trade flows. Table 3.2 gives the results of our estimation.

We start by discussing the effects of population and of the traditional macro-economic variables GDP per capita and the unemployment rate. The (log of) population is included as a measure for the size of the flow: the larger the population in either country, the larger the flow. This is confirmed in the estimation results. Considering the economic indicators, we expect that a

higher level of GDP per capita or a lower unemployment rate in the country of citizenship reduces student flow. Oppositely, a higher level of GDP per capita of a lower unemployment rate in the host country is expected to affect student flow positively. All four effects are indeed confirmed by our results.

Next, we turn our attention to the effects of quality and tuition. As expected, higher educational quality in the host country relative to the country of citizenship increases the student flow in that direction significantly. A rise of relative quality with one percent increases the student flow with 0.5%.

A higher tuition in the host country  $j$  compared to tuition in the country of citizenship  $i$  is expected to decrease student flow to country  $j$ . This is not what is observed; the regression results suggest that a difference in tuition has a *positive* effect on the student flow. Tuition is only a small part of the total expenses when studying abroad; housing costs, living expenses, but also scholarships or other funding are involved. This may distort the effect of the measure of tuition that we use (which is zero in many countries in our sample<sup>11</sup>). Also, eligibility of foreign students to scholarships and study contributions may impose difficulties on the interpretation of this effect.

**Table 3.2 Regression results**

Dependent variable  $\ln ENROL_{ij}$ : logarithm of number of students with citizenship  $i$  following an entire educational program in country  $j$

Variables	Coefficient	Standard error
$\ln POP_i$ (citizenship)	0.56**	0.05
$\ln POP_j$ (host)	1.03**	0.05
$\ln GDPC_i$ (citizenship)	- 0.01	0.25
$\ln GDPC_j$ (host)	0.82**	0.24
$UNEMP_i$ (citizenship)	0.02	0.02
$UNEMP_j$ (host)	- 0.05**	0.01
$\ln DQUAL_{ij}$ : difference in quality	0.52**	0.13
$DTUIT_{ij}$ (in thousands): difference in tuition	0.17	0.06
$LAN_{ij}$ : Linguistic distance	- 0.30	0.28
$REL_{ij}$ : Religious distance	- 1.19**	0.18
$CULT_{ij}$ : Cultural distance	0.02	0.06
$\ln DIS_{ij}$ : Physical distance	- 1.06**	0.11
Constant	- 20.23**	4.90
Adjusted R-squared	0.67	
N	747	

\*\* indicates significance at the 1% confidence level

<sup>11</sup> Sweden, Norway, Denmark, Finland, Germany, Luxembourg and Greece.

Lastly, we consider the effects of distance, both physical and cultural. We have used four distance measures: linguistic, religious, cultural, and geographical distance. We observe that geographical distance has a large negative effect on student mobility. Student flows to a destination 1% further away will be more than 1% lower. This elasticity is much higher than the other effects, like GDP, unemployment and quality. Distance therefore seems to matter a lot for the choice of the destination country. Religious distance also has a substantially and significantly negative effect on student migration. The estimated effect of linguistic distance is also negative, but it is insignificant and much lower. In case of cultural distance, a positive relationship could also be hypothesised, as it is for ERASMUS-students, who rate 'a cultural experience' amongst the most important motivations for studying abroad. The estimated effect of differences in national cultures is negligible, but in combination with the large negative effect of religious differences it seems that students do not prefer a culture totally different from their own. Summarising, our measures of distance have a large negative effect on the international mobility of students.

We performed a series of robustness checks for these regression results. Annex II shows the results for two of them. Including year dummies for 1998-2001 to control for differences of specific years does not change the results (see Annex II). All year dummies are insignificant. We also included country dummies to control for country-specific heterogeneity not captured by the standard regression. The values of the estimated parameters do not show major differences to the standard regression (see Annex II). In all of the regressions we performed our main results stood upright: quality has a positive significant effect and distance a strong negative effect on international student migration. Furthermore, a higher GDP per capita in the host country increases student flows substantially.

### **3.4 Conclusions**

Quality of education is important for students engaged in an entire study-program abroad in their choice to study abroad. Religious and geographical distance matters, too. The effect of tuition is not clear. Our estimation results suggest a lower tuition in the host country decreases student mobility to that country, which is counterintuitive. The definition of the difference in tuition may cause this; in many countries in our sample, tuition is zero. Studying abroad includes other costs as well, i.e. living expenses, housing costs. Furthermore, foreign students may have different channels through which they finance their studies. They may not be eligible to scholarships in the host country, but may be entitled to other scholarships for foreign students only.



## 4 Economies of scale: does size matter?

The idea of economies of scale originates from industrial production: as output increases, the average cost of each unit of production falls through an efficiency increase. The most direct translation of this idea to the field of higher education is that scale economies may exist of a positive relationship between number of students in a school and quality of that school. If scale economies are present, it is expected better schools will have more students. We will empirically explore this hypothesis in the next section. However, even if such a relation would exist, this would not necessarily imply that European coordination is needed. It would be very well possible that even the size of the smaller European countries is sufficient to accommodate a school of the size needed to benefit from these economies of scale within universities.

What matters more for the desirability of European coordination is whether there are significant benefits from the size of a country. Alesina and Spolaore (2003) argue that there are a number of possible benefits of larger populations for the provision of public goods. Two important advantages they mention are lower costs of providing these public goods and higher productivity. Both aspects seem potentially important for higher education.

By creating a single European market of higher education the number of schools/universities on the market is extended. The advantage of an enlarged scale is that an increased number of players may lead to increased competition if markets are not regional. Competition could have (a combination of) three possible effects. More competition could trigger institutes providing higher education

1. to increase their educational quality level;
2. to lower the price of their educational programs. For instance, an efficiency gain could be obtained by concentrating expensive educational programs, e.g. chemical laboratories could be centred in a few locations in the EU;
3. to diversify their supply of educational programs. This effect could be expressed by specialisation: institutes may focus on particular subjects or may decide to focus on either providing good education at Bachelor level or providing excellent research in the Master- and PhD-stages of tertiary education.

It is worth noting that economies of scale, or European coordination, are by no means a necessary condition for competition. Competition between European universities is already ongoing. However, coordination within Europe with respect to uniformizing the structure of and providing information about educational programs makes competition easier.

As in industrial production, there may exist an optimal scale, which may be larger for higher levels of education. Beyond this scale, the market is subdivided into regional markets. In the

United States, separate rankings for regional and national schools exist (Winston, 1999), implying that only the top-schools compete in the national market.

As argued before, to actually benefit from possible economies of scale, student mobility is a crucial necessary condition. When students only choose schools nearby, they will not trigger competition between schools in an enlarged market. In other words, when student mobility is absent, creating a single European market for higher education may not lead to increased competition. If students are mobile and base their choice for a school on its educational quality, competition through economies of scale may increase educational quality.

Recent developments in ICT may have redefined the importance of physical distance in education, but in many cases, distance remains crucial. As far as scientific research is concerned, researchers seem to benefit from gathering in one place.

In her description of the market for higher education in the US, Hoxby (1997) states that it was only a few decades ago that increased information about colleges and students and decreased mobility costs brought about the changing market structure of college education, from local markets to a more integrated market. The number of students attending college in the same state where they already lived declined from 93% in 1949 to 75% in 1994. In accordance with Winston's suggestion above, Hoxby concludes the market is truly national only for top-schools. Especially private (rather than public) colleges have a wide reach in the US market for higher education (Hoxby 1998). It seems that the chances to actually benefit from economies of scale in higher education are still limited, but gradually increasing.

#### 4.1 Scale and quality: do larger countries have better schools?

In the following, we compare the quality of education in a single market for higher education in the US with the far smaller markets of higher education in the EU-members, and with the EU as a whole. To compare quality of education per country, we have constructed a quality measure, using the Top 500 of World Universities 2004 composed by the Institute of Higher Education of Shanghai Jiao Tong University<sup>12</sup>. This quality measure is given by

$$QUAL_i = UNI_i / POP_i \quad (4.1)$$

where  $QUAL_i$  is the quality measure of country  $i$

$UNI_i$  is the number of universities in the Top 500 in country  $i$

$POP_i$  is the population of country  $i$ .

This quality measure has a few limitations. Firstly, it calculates the number of universities in the Top 500 in country  $i$  regardless of the position of each university within the Top 500, i.e. it does

<sup>12</sup> This quality measure was also used in our regression analysis in the previous chapter. More details concerning this ranking can be found in Annex I.

not give universities ranked high within the Top 500 a larger weight compared to those ranked lower. This could result in a downward effect on the quality measured in the US, since universities in the US are present in force in the Top 100. Secondly, the ranking is not only based on indicators regarding quality of education. In fact, most indicators are based on quality of research, such as the number of articles published in high quality journals. Thirdly, we take into account only the number of *best* universities in a particular country to proxy for the educational quality level in that country. However, quality within all universities in a particular country differs. To capture this effect, dividing the number of universities in the Top 500 by the total number of universities in that particular country would improve the measure per country. Lastly, the quality in a particular country relative to the quality in other countries is measured by dividing the *number of universities* in the Top 500 by the population of the country. For our calculation, the number of students enrolled in an institution is not taken into account due to lack of data. Including the number of students enrolled in universities ranked in the Top-500 instead of the number of universities would improve our quality measure. However, enrolment figures for the universities in the Top 500 ranked 1-100 are available, and our conclusions remain unaltered when we use these to calculate our measure as the number of *students* in Top-100 schools per inhabitant rather than the number of schools in the Top-500 per inhabitant. For more details on the measure, we refer to Annex 1.

**Figure 4.1 Does educational quality increase with population?**

'quality': number of universities in Top 500/population in millions

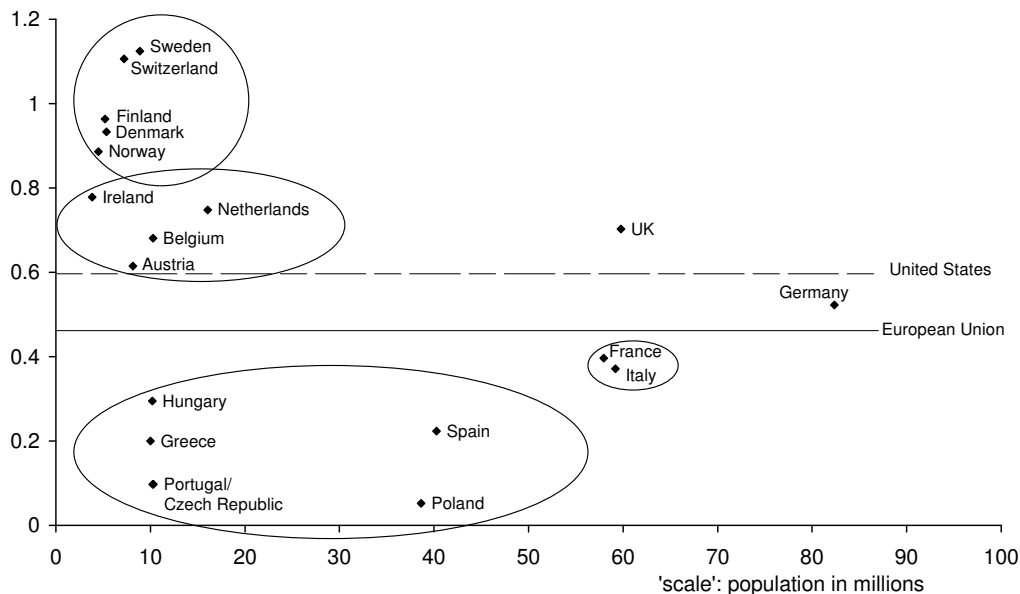


Figure 4.1 depicts the quality of education in a particular country relative to its population. The use of population as a proxy for size is common in comparable empirical assessments of scale effects (see e.g. Rose, 2006). If economies of scale are present, educational quality is expected to increase with population size. In Figure 4.1, it clearly doesn't; countries in the top left of the

figure, i.e. Switzerland and the Scandinavian countries, are seemingly able to provide high educational quality without having a large market size. Many countries seem to exceed the quality level of the US, even though their population sizes are a 30-fold smaller.

What we do observe, is distinct 'regional' categories per quality range: in the top left of the figure, Switzerland and Scandinavia; staying at about the same population levels but somewhat lower quality we find Belgium, The Netherlands, Austria, and Ireland; and in the lower left corner are three East-European countries, and Spain, Portugal, and Greece, not too far from two other Mediterranean countries: Italy and France. These regional categories seem to bear a resemblance to GDP per capita-level: countries with a high level of GDP per capita seem to have a high educational level, whereas poorer countries have lower quality. The mechanism through which this relationship may occur can be through investment in R&D since GDP per capita-level is correlated with R&D investment.

Figure 4.1 raises the question what the relationship is between quality and spending on tertiary education. When looking at the relationship between quality and total<sup>13</sup> expenditure on tertiary education as a percentage of GDP, it seems that a country spending more on tertiary education as a percentage of GDP per capita also provides a higher quality level. Within the EU, Sweden, Finland and Denmark spend most. This relationship does not hold for Germany, Italy, France and the UK. Those countries spend least, together with Greece, Portugal, and Poland. When we plainly look at the relationship between GDP per capita and quality, we find suggestive evidence for a positive relationship (not shown): countries with a higher GDP per capita level seem to have a higher quality level.

Finally, if we compare the US to the EU in Figure 4.1 (striped and solid line, respectively), we find that, on average, quality in the EU as a whole does not exceed quality in the US, even though the total population is larger. This suggests that it is unfavourable for the educational level in the EU that it exists of many countries. However, as just discussed, for some individual countries, maintaining a high educational level does not seem to pose a problem.

In short, Figure 4.1 does not provide evidence for the existence of economies of scale at the country level. Rose (2006) reaches a similar conclusion. He explores possible scale effects for a wide range of indicators and concludes that small countries are not systematically different from large countries. With respect to education he considers the literacy rate, primary school completion and secondary school enrolment and concludes that they all *fell* with country size. There is therefore hardly any empirical evidence that larger countries provide better education.

Other mechanisms may play a role in understanding why scale economies are not observed in the figure, such as the relationship between expenditure on education between countries and its quality, or the lack of financial incentives within a country. Discussing all these aspects in detail goes beyond the scope of this study. We 'simply' aim at finding *evidence* for scale economies instead of explaining why we would not observe them. However, we will pay attention to two of these aspects in section 4.3, namely selectivity and funding. Selectivity and

<sup>13</sup> From public and private sources.

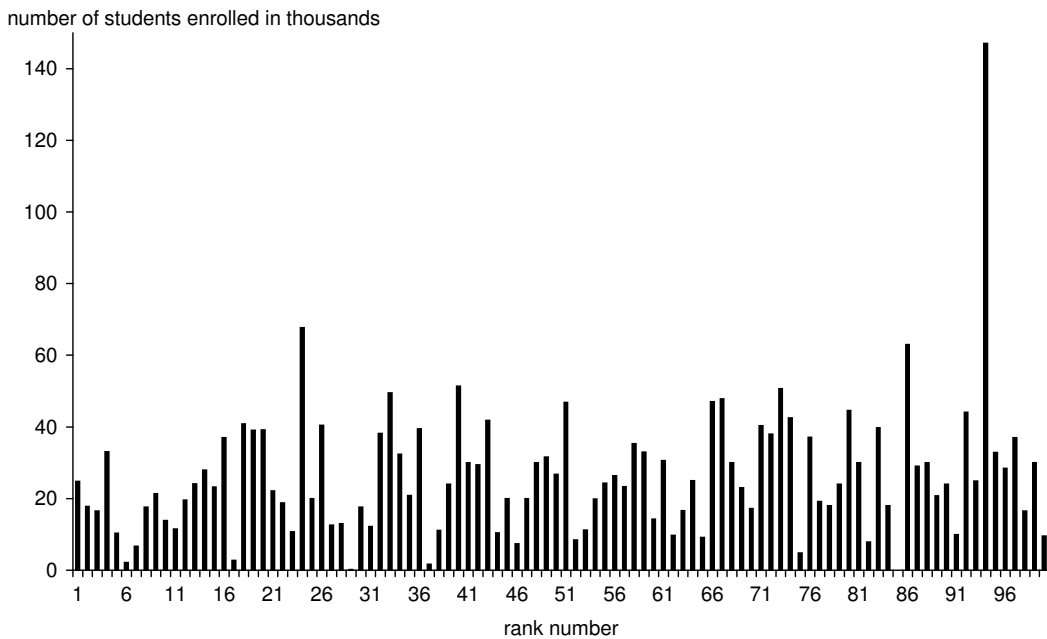
funding seem to be of more importance than the scale of a country in explaining why some countries seem to be able to provide higher educational quality than others.

The next section will first examine if scale economies can be found when looking at the number of students enrolled in a school, and the quality level of that school.

## 4.2 Scale and quality: do better schools have more students?

Economies of scale can also reveal themselves in larger schools having a higher educational quality level. Figure 4.2 presents the number of students in a particular university relative to the rank number of that particular university in the Top 500 of World Universities 2004<sup>14</sup>. If scale economies are present, we expect a declining relationship: the best university (with rank number 1) is expected to have most students. In Figure 4.2, this is not observed; rank number and number of students enrolled seem to bear no relationship<sup>15</sup>.

**Figure 4.2 Do universities with more students provide higher educational quality?**



The university ranked 1 is the best university. This figure only includes the Top 100. The number of students enrolled in the university ranked 85 is missing. The outlier is University La Sapienza in Rome, Italy, with 147.000 students enrolled.

<sup>14</sup> Again, a detailed description of this ranking is given in Annex 1. The ranking also includes a score on size which may blur the conclusion drawn from Figure 2.2. However, when focusing separately on each score, the conclusion remains the same.

<sup>15</sup> Apart from economies of scale, an increasing relationship could also be expected, since a high student number could also imply less personal support per individual student. However, such a relationship is not observed either.

### 4.3 Selectivity and funding

The reason why no economies of scale are observed in the above figures may be that high quality educational institutes are selective in admitting students. Indeed, quality and selectivity seem to be correlated. Eight of the universities in the top ten are from the United States. The admittance rates of the five best universities in the US<sup>16</sup> are all under 25%, and the rates of the ten best lie under 43%. It should be noted that true admittance rates will be far lower due to preliminary selection; most students won't apply to Harvard in the first place. Jacobs and Van der Ploeg (2006) argue that abstaining from selection is a key reason why the number of European top universities is much lower than in the United States. They write: "European universities seem more comfortable providing a decent education for all with not much selection" (Jacobs and Van der Ploeg, 2006, p.557).

In the European Union, the degree of selectivity that higher education institutions apply differs greatly. Vossensteyn (1997) attempts to determine the relative degree of selectivity of higher education systems in nine European countries. He defines selectivity as the entrance procedures and criteria used to determine who may enrol in higher education or in specific higher education institutions or programs and who may not. Selectivity is measured on three aspects: the range of programmes to which selection is applied, the criteria used and their range of application, and the rejection percentages. His qualitative analysis applies to 1996/1997. He concludes Finland, Sweden, and the UK have the most selective higher education systems, followed by Denmark and Germany. Educational systems in Flanders are least selective, followed by Austria and the Netherlands. The public university sector in France is not selective at entrance whereas the private sector (which makes up a quarter of the system) displays high selectivity (Boezerooy et al, 1999). The European Commission also examines selectivity at entry to higher education in the EU based on one of the criteria Vossensteyn (1997) uses: the range of courses to which selection is applied. In accordance with Vossensteyn (1997), the report concludes Finland, Sweden, and the UK are highly selective at university level. Again, Austria's universities are least selective, whereas universities in Germany, Norway, Denmark, France, Italy and the Netherlands are selective for some courses. More surprisingly, they find that universities in Greece, Spain, Ireland, and Portugal are selective for most courses (Eurydice, 2002).

To illustrate the suggested relation between selectivity and quality, we omit the countries known to be selective (the United States, the United Kingdom, Finland and Sweden) from the Top-100. Originally, the Top-100 includes 87 schools located in the US or EEA. After omitting universities in countries known to be selective, only 21 schools remain, and none of them in the Top-25. If selectivity is key to the lack of a relationship in Figure 4.2, leaving out countries which are known to be selective might change our picture. However, if we leave out the US, the

<sup>16</sup> According to the Top 500 of World Universities 2004.

UK, Sweden and Finland, there is still no evidence that larger schools are ranked higher, i.e. no indication of the existence of economies of scale is found either.

The selectivity of universities in the US can be maintained through the way in which universities are financed. In his elaboration on revenues of private educational institutes in the US, Winston (1999) distinguishes between commercial revenues (through tuition fees) and donative revenues (donations by alumni). Winston defines the average costs of providing an educational program (from teacher salaries to renting the building) minus the revenues (tuition fees) as the average student subsidy. He calculates this subsidy to be just over \$8,000 dollar a year in the US (in 1995). Interestingly, subsidies are not equally divided: high quality universities spend about \$22,800 per year of their donative resources to pay the educational costs of their students (\$28,500 a year), whereas a school in the lowest decile (ranked on student subsidy) spends only \$1,800 subsidy per student on total costs of \$7,900 per year. Obviously, the student admitted to the higher quality school has the best deal: 80% of the costs of his education is subsidised, whereas the student in the lowest decile is subsidised for only 23%. The top decile (universities with the highest subsidies) includes all well-known high quality schools (Harvard, MIT, Princeton, Yale, Stanford, etc). The financial structure of these schools is connected to their quality and their high admittance rates: they use donations from alumni to subsidise their new students, who are heavily selected on quality. Often, these students become well-paid alumni, who will give donations (Winston, 1999).

As Winston (1999) shows, selectivity and funding of universities in the US are interrelated. In the European Union, different funding mechanisms exist. Whereas the UK might resemble the situation in the US, most member states finance their educational institutes based on the number of students enrolled or graduated.

#### **4.4 Conclusions**

In short we can conclude that we observe little evidence for the existence of economies of scale. Larger countries within the EU do not provide higher educational quality than smaller ones, and schools with a higher student population are not found to offer higher quality education. Other mechanisms not captured here (e.g., selectivity, financial incentives) may play a role. The relationship between quality and selectivity seems to play a far more important role in explaining why educational institutions are able to offer a certain level of educational quality.





## 5 Cross-border externalities

This section gives an overview of the second category of motives why European coordination of higher education may be theoretically justified: cross-border externalities. The externalities of higher education can be subdivided in human capital spillovers of (mobile) students or (mobile) employees. This section briefly describes the theoretical mechanisms, and provides empirical underpinning on whether or not they are found to exist.

### 5.1 Human capital spillovers of student mobility

The existence of externalities provides a rationale for investing public funds in the field of higher education. If the social returns of higher education exceed the private returns, then individuals will invest too little in higher education from a social welfare perspective. If that is the case, the government should support higher education with subsidies.

Although empirical evidence for the private returns to education is consistent, empirical underpinning of the social returns to education is hard to find. Card (1999) finds that the increase in individual earnings due to an additional year of schooling is between 6-10%. Hartog et al (1999) confirms this figure for the Netherlands. Canton et al. (2005, p.34) conclude on the basis of reviews of the recent literature on human capital spillovers that “economic literature is ambiguous about the existence of human capital externalities at current levels of public intervention, delivering some indications for positive externalities, but not very strong and undisputed.” They mention Blundell et al. (1999), Ciccone and Peri (2002), and Acemoglu and Angrist (2001) as examples of studies that find that private and social returns to education are roughly the same. At current levels of government support, there seem to be no excess social returns to education. Jacobs and Van der Ploeg (2006) reach the same conclusion. They conclude that “the empirical evidence does not suggest persuasive externalities of human capital as the macro returns to education are (at most) equal to the micro returns” (p.571). It is possible however that the balance is different for specific studies. Jacobs and Van der Ploeg (2006) suggest that this may be the case for science, art history and archaeology.

It should be noted that all these studies refer to the returns of education on a national level and discuss the rationale for national governments to further subsidise higher education. To justify European involvement cross-border externalities are necessary. When the balance between social returns and private returns does not give rise to extra national investment in higher education, normally European involvement will be even less interesting. In specific cases there may be an international dimension that changes this regularity. The example of archaeology is a case in a point. The benefits of good archaeology education go beyond borders. Such examples are probably rare, however. In general the social returns of higher education do not provide a rationale for European coordination.

What matters for an assessment of the desirability of European coordination, is whether there are international spillovers associated with higher education. When studying abroad, knowledge from visiting students may be transferred to students in the host country, giving rise to an increase of the quality of education in the host country<sup>17</sup>. Likewise, human capital accumulated in the host country can be transferred to the country of citizenship<sup>18</sup>, and may result in a quality increase in the latter country. If both countries are member of the European Union, this can provide a rationale for European coordination of higher education.

As an example, Baláž & Williams (2004) evaluate the experiences of Slovakian students who had studied in the UK for at least three months. Afterwards, these students indicated that with respect to learning competences they mostly acquired new approaches to work and new ideas during their stay in the UK.

Even though these spillovers of education are intuitively straightforward, empirical evidence is rather scarce. A modest empirical literature focuses on so-called peer effects in higher education, i.e. the effects that students' characteristics and behaviour have on other students' behaviour. Whereas the existence of peer effects has been studied extensively in primary and secondary education (Epple and Romano 1998; Lazear 1999; Hoxby 2000; Ammermueller and Pischke 2006), peer effects are recently suggested to matter in higher education as well. Comparing the influence of room mates' SAT-scores on a student's SAT-score, Winston & Zimmermann (2003) find some evidence that strong students tend to increase peers' academic performance and weak students tend to reduce it, confirming earlier results (Sacerdote, 2001; Zimmermann, 2003). This suggests that students do benefit from the quality of their fellow students. Students who study abroad thus not only acquire knowledge themselves, but their fellow students benefit as well from their presence.

Winston (1999) forcefully argues that peer quality is an input to the production function of the higher education institute that can only be acquired from its own customers. High quality students can even serve as substitutes for other inputs. As an example, at Harvard just half of all the social science students were taught by regular faculty (Clotfelter, 1992). Universities therefore have a strong interest in attracting high quality students. Winston (1999) suggests that schools use their donative resources to become more attractive and to be able to select only the students with the best quality.

Through student mobility, public investment in higher education in the host country also generates positive externalities to the home country. Which country benefits most from student mobility: the home or the host country?

<sup>17</sup> Studying abroad may also facilitate cultural encounters and have important effects on an individual's attitude towards Europe. There is some evidence that these students are more likely to consider themselves at least partly European (King and Ruiz-Gelices, 2003), but it is not clear whether this is the result of studying abroad. These effects are implicitly considered when discussing the effect of studying abroad on the likelihood of subsequent labour migration in the next section.

<sup>18</sup> In this section, the country of citizenship is defined similarly as the home country.

When a student goes abroad for a limited period of time, for instance during an exchange-program, and returns to his home institution afterwards to finish his study (so-called 'credit mobility'), the host country will pay for the education of the student (but he will pay tuition fees to the home institution only). Whether the host country gains from human capital spillovers depends on the quality difference between both countries. The host country will benefit from human capital spillovers if educational quality in the student's home country exceeds quality in the host country.

When a student enrolls in an entire educational program abroad ('diploma mobility'), the host country will pay for the education of the student (but the student will also pay tuition fees to the institute abroad). If the student returns to his country of citizenship for employment, the home country will benefit from the knowledge the student has acquired abroad. Student mobility is a precursor for labour mobility (Tremblay, 2002), and students staying on in host countries form a disadvantage for the home country, although the period of residence abroad may not be forever. A study in the UK revealed that almost half of the foreign students in the UK intended to stay (Home Office/DTI, 2002). This may provide a reason to reconsider the funding of these students by the home country. In a recent study focusing on a study-scholarship for talented Dutch graduates to study abroad, Oosterbeek and Webbink (2006) find that these students are more likely to work and live abroad after they've finished their studies than the talented graduates who were just rejected for the scholarship.

### **Freeriders**

People in countries with high tuition fees (e.g. the Netherlands) could move to a country for educational purposes without tuition fees (e.g. Germany). In this case, the issue of free-riders arises. In this example, the Netherlands would benefit from state-subsidised education in Germany. As a result, Germany would underinvest in education because part of its investment is not beneficial to its own citizens but to the Dutch. European coordination of higher education could prevent this. A solution to free-riders might be to directly finance students instead of financing educational institutes.

In practice, free-riders are only an issue when foreign students are eligible to enrolment to an educational program in another EU-country (and not, for example, restricted by language deficiency), and if they are eligible to the same compensation of tuition fees or scholarships as nationals. The recent verdict by the European Court of Justice in the Bidar case has eased the conditions on eligibility by ruling that EU students, residing legally in another EU country and being able to prove that they are 'integrated sufficiently' in that host country, cannot be refused access to social support: they have to be treated equally to the nationals of that country. In this case, the court found that French student Bidar was 'integrated sufficiently' in the UK since he attended several years of secondary education in the UK and only then applied for the student loan upon starting his university study (which was refused to him) (ESIB, 2005). Still, it is up to

national countries to apply this rule. In countries where the investment per student in higher education exceeds the amount the student spends, free-riders are always an issue.

If foreign students would be eligible to student loans in the country in which they study, problems could occur when they leave the country without repayment of the loan. In order to prevent this, countries should make arrangements, e.g. the debt could be transferred to the country of citizenship of the student when he leaves the host country without repaying his debt. Agreements to collect debts abroad do already exist (CPB, 2004).

## 5.2 Human capital spillovers through labour mobility

Returns to education can also turn out in favour of the host country in case of skilled labour mobility. Although labour mobility within the European Union is known to be rather low, the group of people being most mobile are the highly educated (Antolin & Bover, 1997). Not only are students who have studied abroad more likely to pursue a professional career in that country (Tremblay, 2002), they may also be more likely to start their career in another foreign country. If the student is educated in his/her country of citizenship, and finds employment abroad, the host country will benefit. Consequently, the country of citizenship underinvests in education, since the returns to education leak away to other countries. Justman and Thisse (1997) show that a government that maximises the utility of immobile residents indeed will reduce investment in public education when the educated become mobile. This provides a motive for European coordination. Brain drain literature highlights the losses that emigration poses on countries of citizenship (Grubel & Scott, 1966; Bhagwati & Hamada, 1974).

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### Mobility of skilled labour within the EU

In 2002, well over 2% of all highly skilled employees<sup>a</sup> in the Netherlands came from other EU-countries<sup>b</sup>, and another 1.5% from other non-EU countries. During 1996-2002, the number of highly-skilled from other EU-countries employed in the Netherlands remained about the same. As stated above, labour mobility of the high-skilled exceeds labour mobility among employees with all skill-levels. In 2002, about 1.5% of total employees in the Netherlands with all skill levels came from other EU-countries<sup>c</sup>.

As for the Dutch abroad, in 2002, 1.7% of Dutch higher education graduates started their professional career in other EU-countries. Only 0.2% went to non-EU countries. Thus, if Dutch graduates decide to start their career abroad at all, they prefer other EU-countries to go to, and, usually, for research: 30% starts in a research position. Not all EU-countries share a low percentage of graduates working abroad; in the United Kingdom, 7.3% of graduates went abroad in 1997, and over 5% of Austrian and French graduates went to work abroad in the same year<sup>d</sup>.

<sup>a</sup> Highly skilled employees are employees with a tertiary education degree.

<sup>b</sup> Not including the new member states.

<sup>c</sup> Source: Eurostat, Labour Force Survey.

<sup>d</sup> Source: Cheers Survey, 1999; EZ/ROA, 2003.

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Data indeed suggest that student mobility may be a precursor for labour migration. A study carried out in the United States of a sample of 4200 temporary immigrants holding an H1B visa shows that some 23 per cent of them previously held a student visa (US Immigration and Naturalisation Service, 2000). An H1B visa is issued for a maximum period of 6 years to highly qualified persons sponsored by an American employer who cannot find an equivalent applicant in the United States. They may replace a student visa, and they are often the first stage in a permanent immigration process (Tremblay, 2002).

King and Ruiz-Gelices (2003) find that students who studied a year abroad were roughly twice as likely to have migrated abroad since graduation compared to students who did not study abroad. A problem in these kind of comparisons is that they can not correct for possible intrinsic differences between both groups, like differences in their international orientation.

One rare example of a study that tries to control for these differences is Oosterbeek and Webbink (2006). They estimate that students who studied abroad are 15 to 18%-points more likely to live abroad. If selection issues are taken into account, the regression results even suggest that 7 to 9 months of studying abroad increases the probability of living abroad with more than 30%-points. These estimates are based on the sub sample of students who changed their period of studying abroad as a result of receiving the grant and may not be representative of the whole group of students.

Dreher & Poutvaara (2005) try to establish the effect of student mobility on subsequent migration in the United States using panel data for 78 countries of origin over the period 1971-2001. Their results confirm that the stock of foreign students is an important predictor of subsequent migration. All in all, there is plenty of evidence for the impact of student mobility on labour mobility.

### **The relation between education and R&D**

The positive externalities of Research and Development (R&D) are evident (Coe & Helpman, 1995; Canton et al, 2005). Since R&D is mainly performed by the highly-skilled, a proper education may be a necessary condition in order to achieve these positive externalities, i.e., education may have positive externalities through achieving more R&D. As in the previous reasoning, European coordination won't affect graduates leaving for non-EU countries to start a research position.

Bassanini and Ernst (2002) attempt to estimate the effect of human capital on R&D-intensity. They relate sectoral R&D intensity to human capital measured as the share of workers with completed upper-secondary education in the total population. A standard deviation increase in the measure for human capital leads to 16.8% in the R&D intensity. Thus, the positive externalities of R&D are indirectly influenced by the level of education. Since the positive externalities of R&D seem to be rather convincing, and R&D is complementary to higher education, the subsidiarity question with respect to R&D might be answered in a different fashion than it is answered for higher education.

### 5.3 Conclusions

Cross-border externalities form a theoretical motive for lifting coordination of higher education to a higher - i.e. European - level. Empirical evidence for the importance of cross-border externalities is rather scarce. Direct human capital spillovers of student mobility are difficult to estimate. It also remains ambiguous who will benefit - the host country or the country of citizenship, depending on the educational quality in both countries in case of credit mobility, and whether or not the student returns to his country of citizenship or not in the case of diploma mobility.

Indirect human capital spillovers may be more important. They may materialise through labour mobility among the high-skilled or through the effects of human capital on R&D. Regarding the latter, there is substantial evidence that R&D brings along positive externalities and that education is necessary for R&D. Furthermore, a number of studies suggest that student mobility is a precursor for skilled labour mobility. These channels through which higher education generates cross-border externalities are only indirect effects. It is therefore hard to assess the practical importance of these externalities. However, as long as labour mobility within the EU remains low, the effects will probably not be very large.

## 6 Conclusions and implications

The theoretical motives for European coordination of higher education can be grouped in economies of scale and cross-border externalities. Regarding the first group, we analyse the relationship between educational quality in a country and the population of that country. When economies of scale are present, we expect that a country with a larger population will have schools providing higher educational quality. We find little evidence for economies of scale. What we do observe is distinct 'regional' categories per quality range: the Scandinavian countries and Switzerland have high educational quality and relatively small populations; the Southern European countries and new member states have lower educational quality. We also analyse the relationship between educational quality of a school and the number of students enrolled in that school. We expect that better schools have more students. Again, we find scarce evidence to support such a relationship. In short, we can conclude we find little evidence for economies of scale, and therefore little support for European coordination as far as the first motive is concerned. Other mechanisms may play a role in understanding why scale economies are not observed, such as differences in the organisation of national markets for higher education. Selectivity and funding seem to be of more importance than the scale of a country in explaining why some countries are able to provide higher educational quality than others.

Regarding the second theoretical rationale (cross-border externalities), we examine human capital spillovers of mobile students, human capital spillovers of mobile employees, the conditional relationship between education and R&D, and free-riders. Mobility is of vital importance in order to benefit from human capital spillovers. We find empirical evidence for externalities is rather scarce. There is little evidence for human capital spillovers, and almost no information on free-riders. However, there is support for the idea that higher education has indirect positive spillovers through the positive externalities of R&D. Furthermore, a number of studies suggest that student mobility is a precursor for labour migration. As labour mobility within the EU is low, we should not expect too much from these indirect effects. These effects may however justify making degrees more comparable within the European Union in order to remove some of the barriers for the mobility of high skilled labour.

A necessary condition for human capital spillovers and economies of scale is mobility of students. If students do not base their choice on educational quality, a single European market for higher education will not lead to more competition and more quality. We find that quality does matter for students. However, since we do not find any evidence for economies of scale, this has little implication for answering the subsidiarity question. The effect of tuition on student mobility is counterintuitive, although not significant. This might be related to scholarships students are entitled to. Distance seems to matter a lot for the choice of the students' destination. This imposes borders to what possibly can be achieved with European coordination.

Concluding, we find little empirical support for European coordination of higher education. Distance still matters more to students than quality, economies of scale are absent and the empirical underpinning of the importance of external effects is scarce. Still, there are potential benefits through indirect spillovers of human capital. Therefore this does not imply that uniformizing the structure of higher education in the EU, and making educational programs more transparent, is to no avail. Quality does matter for students, and student mobility is an ongoing process. This may be beneficial to labour mobility.

What does this imply for the potential of the Bologna agreement? Jacobs and Van der Ploeg (2006) list four potential benefits of the introduction of the dual Bachelor-Mastersystem in all European member states. They claim that it (i) encourages students to complete their studies more quickly, (ii) reduces the risk of choosing the wrong course, (iii) stimulates product variety and (iv) can strengthen competitive pressures and enhance transparency. Of these benefits, only the last has a clear international dimension and could be a possible justification for European coordination. As argued above, increased transparency of higher education would certainly be beneficial. Indeed, information asymmetries provide a key reason why institutes of higher education are probably best operated as non-profit enterprises (Winston, 1999).

However, we should not expect too much from these changes. First, the positive effects of the introduction of the dual Bachelor-Mastersystem on student mobility are not guaranteed. The shorter study length may make it more difficult to spend half a year studying abroad compared to the present system. Second, real competition between European universities is still far away. As Jacobs and van der Ploeg (2006, p.556) note, a prerequisite for the potential advantages to materialise is “a revolutionary change in mindset” as currently most students “go to their local university or college near to the home of their parents even if this is evidently a bad match with their talents or their demand for education.” The empirical evidence that we have presented in this paper shows that this revolution seems nowhere near. Distance often proves a prohibitive obstacle to student mobility. In addition, enlarging the scale will probably not lead to more competition between universities and higher quality levels. To achieve such effects, national governments should first reconsider the structure of the system of higher education in their own countries.



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## ANNEX I Quality measure

Since our dependent variable is student flow between countries, we also need a quality measure per country. To construct this quality measure, we use the Top 500 of World Universities 2004, composed by the Institute of Higher Education of Shanghai Jiao Tong University. Universities are ranked by six indicators listed in the table below.

Criteria	Indicator	Weight (%)
I. Quality of Education	Alumni of an institution winning Nobel Prizes and Fields Medals	10
II. Quality of Faculty	Staff of an institution winning Nobel Prizes and Fields Medals	20
	Highly cited researchers in 21 broad subject categories	20
III. Research Output	Articles published in Nature and Science <sup>a</sup>	20
	Articles in Science Citation Index-expanded and Social Science Citation Index	20
IV. Size of an Institution	Academic performance with respect to the size of an institution	10

<sup>a</sup> For institutions specialized in humanities and social sciences such as London School of Economics, N&S is not considered, and the weight of N&S is relocated to other indicators

For each indicator, the highest scoring institution is assigned a score of 100, and other institutions are calculated as a percentage of the top score. The distribution of data for each indicator is examined for any significant distorting effect; standard statistical techniques are used to adjust the indicator if necessary.

The indicators are defined as follows:

### Alumni

The total number of the alumni of an institution winning Nobel Prizes and Fields Medals. Alumni are defined as those who obtain bachelor, Master's or doctoral degrees from the institution. Different weights are set according to the periods of obtaining degrees. The weight is 100% for alumni obtaining degrees in 1991-2000, 90% for alumni obtaining degrees in 1981-1990, 80% for alumni obtaining degrees in 1971-1980, and so on, and finally 10% for alumni obtaining degrees in 1901-1910. If a person obtains more than one degrees from an institution, the institution is considered once only.

### Award

The total number of the staff of an institution winning Nobel prizes in physics, chemistry, medicine and economics and Fields Medal in Mathematics. Staff is defined as those who work at an institution at the time of winning the prize. Different weights are set according to the periods of winning the prizes. The weight is 100% for winners in 2001-2003, 90% for winners in 1991-2000, 80% for winners in 1981-1990, 70% for winners in 1971-1980, and so on, and finally 10% for winners in 1911-1920. If a winner is affiliated with more than one institution,

each institution is assigned the reciprocal of the number of institutions. For Nobel prizes, if a prize is shared by more than one person, weights are set for winners according to their proportion of the prize.

### **HiCi**

The number of highly cited researchers in 21 broad subject categories in life sciences, medicine, physical sciences, engineering and social sciences. These individuals are the most highly cited within each category for the period of 1981-1999. The definition of categories and detailed procedures can be found at the website of Institute of Scientific Information.

### **N&S**

The number of articles published in Nature and Science between 1999 and 2003. To distinguish the order of author affiliation, a weight of 100% is assigned for corresponding author affiliation, 50% for first author affiliation (second author affiliation if the first author affiliation is the same as corresponding author affiliation), 25% for the next author affiliation, and 10% for other author affiliations. Only publications of article type are considered.

### **SCI**

Total number of articles indexed in Science Citation Index-expanded and Social Science Citation Index in 2003. Only publications of article type are considered.

### **Size**

The total scores of the above five indicators divided by the number of full-time equivalent academic staff. If the number of academic staff for institutions of a country cannot be obtained, the total scores of the above five indicators is used. For ranking - 2004, the number of full-time equivalent academic staff are obtained for institutions in USA, China (mainland), Italy, Netherlands, Sweden, and Belgium etc..

The quality measure we use is constructed by calculating<sup>19</sup>

$$QUAL_i = UNI_i/POP_i$$

where  $QUAL_i$  is the quality measure of country  $i$

$UNI_i$  is the number of universities in the Top 500 in country  $i$

$POP_i$  is the population of country  $i$ .

<sup>19</sup> Please remember that the subscript  $i$  is used for the country of citizenship, whereas subscript  $j$  denotes the country hosting the student.



Thus, we calculate the number of universities in the Top 500 in a country per inhabitant, in order to correct for the size of the country.

In our regressions, the (natural log of the) difference in quality is included as a explanatory variable:

$$DQUAL = QUAL_j / QUAL_i$$

$$\ln DQUAL = \ln QUAL_j - \ln QUAL_i$$

We have the score of each institution on each indicator listed in the table above. Since we are trying to determine the impact of quality of education on student flow, category III can be left out. However, since all scores are normalized it is not valid to compare them. Therefore, omitting this category is not valid either. Unfortunately, Shanghai Jiao Tong University does not provide individual scores.



## ANNEX II Regression results - Robustness analysis

This annex gives insight into the robustness of our results in section 3.3. Table A.1 shows the regression results when year dummies or country-specific dummies are introduced for the country of citizenship. Country-specific dummies capture all country-specific heterogeneity in the specification. Including these dummies does not cause large deviations in the estimates.

**Table A.1 Robustness analysis**

Dependent variable  $\ln ENROL_{ij}$ : logarithm of number of students with citizenship  $i$  following an entire educational program in country  $j$

Variables	Including year dummies		Dummies country of citizenship	
	Coefficient	Standard error	Coefficient	Standard error
$\ln POPI$ (citizenship)	0.58**	0.05	Omitted	
$\ln POP_j$ (host)	1.04**	0.05	1.23**	0.03
$\ln GDPC_i$ (citizenship)	0.02	0.25	Omitted	
$\ln GDPC_j$ (host)	0.86**	0.25	0.84**	0.13
$UNEMP_i$ (citizenship)	0.02	0.02	Omitted	
$UNEMP_j$ (host)	- 0.05**	0.01	- 0.01	0.01
$\ln DQUAL_{ij}$ : difference in quality	0.52**	0.13	0.73**	0.11
$DTUIT_{ij}$ ( <i>in thousands</i> ): difference in tuition	0.17	0.062	- 0.067	0.072
$LAN_{ij}$ : Linguistic distance	- 0.30	0.28	Omitted	
$REL_{ij}$ : Religious distance	- 1.19**	0.18	Omitted	
$CULT_{ij}$ : Cultural distance	0.02	0.06	Omitted	
$\ln DIS_{ij}$ : Physical distance	- 1.06**	0.11	- 1.43**	0.08
Constant	- 21.41**	5.01	Country dummies (all significant)	
Adjusted R-squared	0.67		0.70	
N	747		1324	

\*\* indicates significance at the 1% confidence level