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*Terugkeer van Europese doctoraatsstudenten in de VS : hoeveel keren er terug en wanneer ?*

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## Introduction

- 1 Fostering student mobility within Europe has been on the EU agenda for several years. Policy initiatives such as the Erasmus programme and the Bologna process are meant to facilitate and stimulate mobility within the EU, and have considerable success, particularly the Erasmus programme. However, in the bigger picture of global student mobility it remains a stylized fact that the US still attracts the largest number of foreign students (OECD, 2010). Students cite the quality of US higher education as the main attractive factor (Alberts and Hazen, 2005). This is illustrated by the overwhelming dominance of the US in the top of numerous university rankings that have attracted attention in recent years, such as the Shanghai ranking and the Times Higher Education ranking.
- 2 A large number of students going to the US for higher education is not worrisome per se, if these students accumulate more and better human capital than they could have in their home country (Gibson and McKenzie, 2010). Indeed, European students tend to be overrepresented in top programs compared to students from other continents, which indicates that for many European students access to the highest quality education is a prime reason to move to the US (Bound *et al.*, 2009). Having a number of students or graduates abroad can help with establishing business and trade links (Saxenian, 2005) as well as ties to the frontier of knowledge (Agrawal *et al.*, 2011). Moreover, among the general population of emigrants, returnees are found to earn a wage premium over stayers upon return (Barrett and O'Connell, 2001) and have a higher "rate of

entrepreneurship” (McCormick and Wahba, 2003), which indicates that a stay abroad arguably increases non-observable human capital.

- 3 As Europe is increasingly emphasizing the importance of higher education and research for economic growth and welfare<sup>1</sup>, one of the worries of policy makers is that a sizable share of its most talented students leave Europe to pursue a tertiary degree in the US and that a share of these outgoing students may choose not to return upon completion of their studies. If the stay rate of foreign students in the US is very high, then the EU loses a significant number of its highly skilled workers. Given the increasing transition to a knowledge economy in Europe, losing the best and brightest knowledge workers could impact European growth and welfare negatively. These negative impacts range from fiscal consequences due to the absence of a share of a country’s highest earners to a decrease in tacit knowledge spillovers (Kapur and McHale, 2005 ; Agrawal *et al.*, 2011). Therefore it is important to gain insight into the return decisions of European students in the US. How many return ? When do they return : immediately, or after a few years of work experience in the US ? Do these students return to their home countries or to other European countries ? And what policy measures can Europe implement to stimulate the return of its best and brightest students at American institutions ?
- 4 Reliable and detailed data on the return rates of foreign students remain scarce. The National Science Foundation surveys students who receive doctorates in science and engineering disciplines, and specifically asks foreign students whether they have the intention to stay in the US after completion of their PhD. The most recent report finds that the share of foreign PhD students with intentions to stay has increased to 78 % in 2008, up from 63 % in 1988-1996 (NSF, 2010). In similar surveys, other authors have found comparable intended stay rates (Aslanbeigui and Montecinos, 1998 ; Wadhwa *et al.*, 2009). However, students’ stated intentions may not represent their actual staying decisions accurately. Some student visas require a student to leave the country upon completion of the studies, even though the student would prefer to stay in the US (Kahn and MacGarvie, 2008). Students’ initial intentions can also change as they become more familiar with the country or if they receive an attractive job offer (Alberts and Hazen, 2005). In an effort to obtain stay rates of foreign students that are not based on students’ stated intentions, Finn (2010) calculates stay rates using tax records. He finds that in 2007, the one-year stay rate of foreign students is as high as 73 %, although the ten-year stay rate is smaller, at 60 %. Stay rates have gone up steadily throughout the 1990s, although they have started to level off since the dotcom bubble in the early 2000s. Stay rates vary strongly by discipline and country of origin, however. Students of European origin are less likely to stay compared to students from Asia. In particular, students from China and India have exceptionally high stay rates, at 94 % and 91 % one year after graduation, respectively. In part reflecting differential study choices across nationalities, students in sciences and engineering have higher stay rates than students in social sciences and economics.
- 5 Although the studies above shed light on foreign students’ decisions to stay, as well as – to a certain extent – the timing of return, there remains little information on where students of European origin return to : their home country, another European country, or another country outside of Europe ? Which countries are most attractive to students who decide to leave the US, but do not return home ? And how do characteristics of

returnees compare to those of stayers ? This study aims to contribute to filling this gap in our understanding of global flows of foreign students.

## Data

- 6 We have compiled a unique dataset with information on the careers of 348 European researchers with a PhD in economics from the US or Canada. The starting point for our dataset is the ProQuest Dissertation database, which contains information on PhDs awarded at US institutions as well as some Canadian universities. The ProQuest database is matched to the Institute of Scientific Information (ISI)'s Social Science Citation Index (SSCI). For reasons of compatibility with the SSCI, only PhDs awarded between 1992 and 2006 are retained. Our focus is on PhD holders who opt for a research career, therefore we only keep those researchers with at least one publication in the SSCI. Given that our publication data were drawn at the end of 2008, and the most recently awarded PhDs are from 2006, even the youngest researchers in our dataset should have had enough time to publish at least once. We assume that PhD holders without at least one publication have opted for a career outside research. This leaves us with a set of 4,761 researchers with at least one ISI publication. From these we draw a stratified sample, oversampling those researchers with multiple publications. More specifically, we sample 100 % of those researchers with 2 or more publications (2,735 researchers), and 20 % of researchers with just 1 publication (405 researchers).
- 7 For the 3,140 researchers in our stratified sample, we collect information on their nationality, education and career by searching the web for faculty profile pages, personal web pages or curriculum vitae. We find a total of 2,049 web pages and 1,335 curricula, thus obtaining (at least partial) information for 2,277 researchers. From these web pages and CVs we extract information on a researcher's higher education and career track. Not all CVs provide equally detailed information, but generally education and career track are listed in adequate detail. Nationality is explicitly specified in roughly 30 % of the cases ; for the remaining 70 % we derive nationality from the country where the bachelor's degree was obtained<sup>2</sup>.
- 8 Since we are interested in the mobility decisions of European researchers who came to the US during their higher education years, we only study the subsample of researchers from the countries of the European Union, plus Belarus, Croatia, Iceland, Latvia, Norway, Russia, Serbia, Switzerland and the Ukraine. After excluding people with a career in industry, we are left with a sample of 348 Europeans who earned a PhD in the US or Canada between 1992 and 2006 and who have built a career in academia or in research departments of other institutions such as the Federal Reserve, the World Bank, the IMF, etc. The average age of in our sample is 40 years, and only 17 % are women.
- 9 An important caveat is that our sample is not representative of the entire population of European researchers with an economics PhD from the US, for several reasons. One reason is that only researchers with at least one publication are included, and a smaller sample is drawn from those with only one publication. A second reason is that our graduation years are restricted between 1992 and 2006, which yields a relatively young cohort in comparison to the entire population. The descriptive statistics presented in the remainder of the paper are not corrected for this. Nevertheless, it is interesting to study this sample even if it is biased towards researchers with multiple publications.

After all, the most productive researchers are the ones that make the most important contributions to innovation and growth, and therefore these are the researchers that Europe should be most interested in attracting back.

## Mobility statistics

- 10 Table 1 displays mobility statistics for the sample of European researchers. A researcher's location is observed at two points in time : for the first job immediately after completion of the PhD, and for the current job. Researchers have four options : they can return to their home country, to another European country, to a country in the rest of the world (RoW), or they can stay in the United States<sup>3</sup>. The first column displays the number of observations per subgroup. The even columns contain the sample probability of a particular location for the first job, whereas the uneven columns contain the same for the current job.

**Table 1. Mobility statistics by subsample.**

			home		Europe		RoW		stay	
		obs	1st job	current job	1st job	current job	1st job	current job	1st job	current job
Europe*		348	0.18	0.24	0.11	0.10	0.03	0.02	0.69	0.64
EU 15		283	0.20	0.26	0.11	0.11	0.03	0.02	0.66	0.61
EU 12**		31	0.10	0.23	0.06	0.03	0.03	0.00	0.80	0.74
Western Europe		119	0.14	0.19	0.12	0.10	0.03	0.03	0.71	0.68
	Germany	43	0.16	0.21	0.12	0.12	0.02	0.02	0.69	0.65
	UK	23	0.22	0.09	0.00	0.04	0.09	0.13	0.70	0.74
	France	23	0.13	0.22	0.13	0.04	0.04	0.00	0.70	0.74
Southern Europe		154	0.23	0.30	0.12	0.12	0.03	0.01	0.62	0.57
	Italy	92	0.17	0.21	0.15	0.15	0.03	0.01	0.64	0.63
	Spain	37	0.38	0.38	0.05	0.05	0.00	0.03	0.57	0.54
	Greece	18	0.22	0.56	0.06	0.06	0.06	0.00	0.67	0.39
Scandinavia		25	0.24	0.32	0.08	0.08	0.00	0.00	0.68	0.60
Eastern Europe		50	0.06	0.14	0.06	0.04	0.02	0.02	0.86	0.80
* Austria, Belarus, Belgium, Bulgaria, Cyprus, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, UK, Ukraine, the Netherlands										

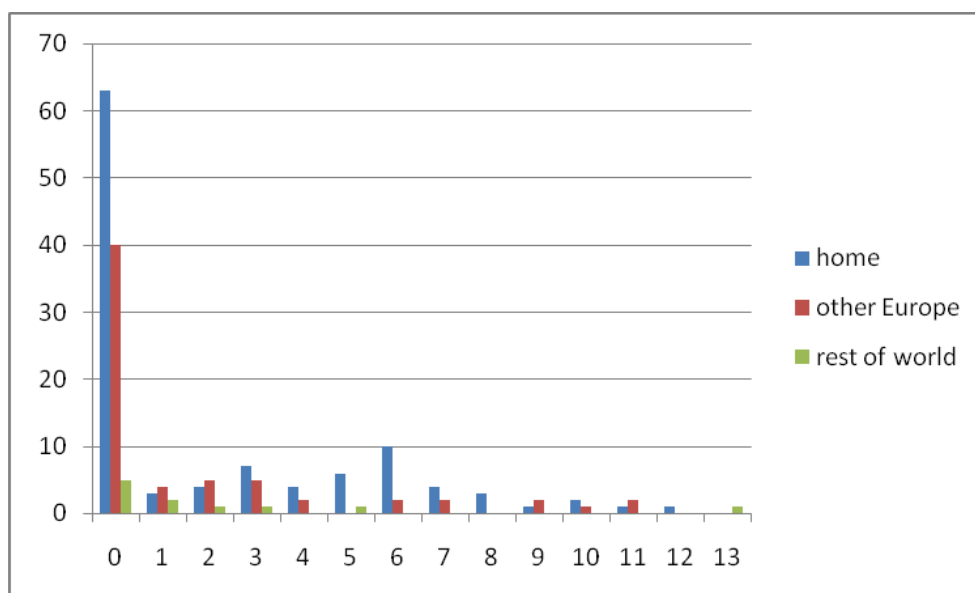
** member states who joined the EU since 2004						
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- 11 The first row contains the mobility statistics for the entire sample of Europeans. Observing those that return to their home country, Europe does not appear to have a particularly high return rate, neither for immediate return (18 %) nor for later return (24 %). However, if we consider return to another European country as similar to returning to one's home country, then the European return rate is about a third higher : 11 % go to another European country for their first job. A slightly lower 10 % do so for the current job. A small percentage of researchers settles in another country outside of Europe and outside of the US. The vast majority, however, stay in the US : 69 % for the first job, and 64 % for the current job.
- 12 Rows two and three contain the same mobility statistics, but for the countries of the European Union before the 2004 enlargement (the EU 15) and for the countries that joined the Union in 2004 and 2007 (the EU 12). We observe that the return rates are lower for the new member states, both for return home and for return to another European country. Arguably, researchers from the new member states perceive their migration to the US as students as a permanent move, whereas researchers from richer western European countries have a higher tendency of regarding it as temporary.
- 13 The lower half of the table splits Europe into separate geographical regions : Western Europe, Southern Europe, Scandinavia and Eastern Europe. Additionally, location decisions for a few individual countries are displayed, if the number of observations from that country exceeds 15. Within Europe, Scandinavia and Southern Europe have the highest return rates, at 24 % and 23 % for the first job, respectively. In both regions the return rates also rise considerably between the first and the current job, notably to 32 % and 30 %, respectively. These high return rates are probably linked to the high quality of the higher education and research environment in Scandinavia, but are probably explained by cultural and family factors in Southern Europe. Greece, in particular, stands out because of its high return rate for the current job, at a whopping 56 %. Another possible explanation is that for Southern Europe, the "been-to-the-US" effect is more important for career progression than elsewhere on the old continent. This would explain why we observe low return rates at first, as PhD holders stay in the US to accumulate a few years of work experience, but high return rates later on, as these researchers return home and use their US work experience to get promoted at a home country university.
- 14 Eastern Europe, by contrast, stands out with very low return rates : 6 % for the first job, and a slightly higher 14 % for the current job. This may be related to the lack of professional opportunities for academic economists in this region as well as the larger difference in salaries between these countries and the US. Returning to another European country is apparently not seen as an alternative to returning home ; the majority choose to remain in the US. By contrast, Italians and Germans have the highest propensity of taking up a job in another European country.
- 15 Within Western Europe, the UK stands out as an odd case : the initial return rate (22 %) exceeds the current return rate (9 %). Along their careers, UK researchers who initially return home become mobile again and move to jobs in the rest of Europe, the rest of

the world and the US. Note, however, that with only 23 observations the movements of a few individuals strongly affect the average return rates.

- 16 The variations in stay rates and return rates between the first and the current job point to the question of the timing of return. Figure 1 displays the timing of mobility decisions for return home, return to another European country, and return to another country outside of Europe, for those individuals who are observed in (one of) these three locations at some point in their careers. The horizontal axis indicates the number of years after graduation until the researcher is first observed in each location ; the vertical axis indicates the number of researchers that move to a particular location at each point in time. As we already observed in table 1, the majority of returnees return immediately after they obtain their PhD. Especially PhD holders who move somewhere other than their home country are more likely to move directly after graduation. Moving to another European country is most likely to happen very early in a researcher's career. For return to the home country we observe a gradual increase in return in the first years of the career after the initial wave right after the PhD. This increase continues until 6 years after graduation, whereas afterwards return becomes very unlikely. This increase in return rates may be related to the tenure system in the US. Since the tenure decision is typically taken after 7 years, before that time a number of researchers may be forced to return to the job market and decide to return home at that point. From a policy perspective, the timing of return decisions implies that the EU should focus its recruitment efforts on young researchers who have not yet received tenure, and particularly on recruiting back recent graduates.

**Figure 1. Timing of mobility decisions.**



- 17 A unique feature of our data compared to other studies is that we are able to track in which particular countries students work if they leave the US. Table 1 already listed the return rates by country for those who return home. Table 2, below, lists the top destinations for those PhD holders who move to another European country (upper panels) or another country outside of Europe (lower panels). The left panel of the table contains the most popular destinations for the current job, while the right panel lists those for the first job. Within Europe, the UK is indisputably the most popular

destination. The UK indeed hosts more than one top institution that may be attractive for European researchers who return to Europe : the London School of Economics, Oxford and Cambridge are consistently ranked in the top 50 of several economics departments rankings. Another factor that may contribute to the attractiveness of the UK for returning Europeans is the fact that English is the native language. As English has become the lingua franca of science, researchers have become increasingly used to communicating in this language and may thus experience less adaptation costs from moving to an English-speaking country than from moving elsewhere. Belgium and Spain complete the top 3 for the first job, and France and Spain for the current job. That Spain should feature as a top destination for other European nationalities is not surprising : in the field of economics, it hosts a few highly regarded institutions such as Universidad Pompeu Fabra in Barcelona or Universidad Carlos III in Madrid. However, we must point out that our number of observations is very small : beside allowing us to confirm the dominance of the UK as the preferred destination within Europe, little can be said with any degree of certainty about the attractiveness of other countries within Europe.

- 18 For those who move to a country outside of Europe, Australia is one of the preferred destinations. Again, this country is English-speaking, which lowers the moving costs in terms of adaptation to a new environment. For the first job, Israel also seems to be a preferred destination, which is not surprising because Israel hosts a few top institutions in economics, notably Hebrew university and Tel Aviv university. However, again we must warn that as the number of researchers going to other countries outside Europe is very small, we cannot draw any decisive conclusions on actual mobility patterns to these countries.

**Table 2. Return migration to Europe and the rest of the world : top destinations.**

top 5 destinations for those currently working in ...			top 5 destinations for first jobs in...		
Europe			Europe		
current country	Freq.	Percent	1st job country	Freq.	Percent
UK	14	41.18	UK	12	32.43
France	5	14.71	Belgium	6	16.22
Spain	5	14.71	Spain	6	16.22
Germany	3	8.82	France	5	13.51
Switzerland	3	8.82	Germany	3	8.11
Cyprus	1	2.94	the Netherlands	3	8.11
Hungary	1	2.94	Czech Republic	1	2.7
Sweden	1	2.94	Ireland	1	2.7
the Netherlands	1	2.94	Total	37	100



Total	34	100	RoW		
RoW			country	Freq.	Percent
current country	Freq.	Percent	Australia	2	22.22
Australia	4	57.14	Israel	2	22.22
China	1	14.29	China	1	11.11
Singapore	1	14.29	Japan	1	11.11
the Philippines	1	14.29	Mexico	1	11.11
Total	7	100	Singapore	1	11.11
			Turkey	1	11.11
			Total	9	100

- 19 For policy purposes, it is informative to know whether PhD holders who return have significantly different characteristics than PhD holders who choose to stay in the US. Table 3 compares a few personal and professional characteristics of researchers in different locations for their first job and their current job. T-tests are done to test whether means differ significantly between researchers at home, elsewhere in Europe or elsewhere in the world versus in the US. One, two and three asterisks denote significantly different means at the 10 %, 5 % and 1 % level, respectively.
- 20 We observe that researchers who return home or to Europe have on average graduated earlier than their counterparts who remain in the US. This may indicate a cohort effect, but more likely tells us that researchers who have graduated earlier have had more time to make their move back home than younger graduates.

**Table 3. Characteristics by location.**

	home		Europe		RoW		stay	
	1 <sup>st</sup> job	current job	1 <sup>st</sup> job	current job	1 <sup>st</sup> job	current job	1 <sup>st</sup> job	current job
degree year	1996***	1997***	1998*	1998***	1999	1997	1999	1999
female	0.19	0.14*	0.22	0.21	0.11	0.00	0.22	0.24
funding source : host	0.27*	0.29**	0.43	0.41	0.56	0.43	0.39	0.41
funding source : other	0.18	0.18	0.19	0.18	0.44	0.14	0.24	0.26

funding source : home	0.35*	0.36**	0.30	0.29	0.00	0.00	0.23	0.22
US topic	0.17**	0.21	0.16	0.24	0.11	0.00*	0.32	0.31
home topic	0.24**	0.22**	0.22	0.18	0.11	0.00	0.11	0.11

- 21 More salient are the findings for the funding source of a researcher's PhD. In our CV coding, we have recorded three dummy variables that indicate whether a researcher's PhD was funded by a grant or fellowship of the PhD granting institution itself (host), of another US institution such as the Sloan foundation (other) or of an institution in the home country (home). Researchers who stay in the US are significantly more likely to have been funded by their host institution, whereas researchers who return home are significantly more likely to have been funded by the home country. This would imply that if Europe wants to attract bright young researchers back from the US, it should provide more funding for students to study in the US in the first place. It is worth considering tying this funding to a Europe-oriented research topic for the dissertation, because researchers who return home are significantly more likely to have used European data or a European case study in their dissertation compared to those who remain in the US (home topic). By contrast, researchers who initially remain in the US are more likely to have used US data or treated a US-specific topic in their dissertations. In other words, the geographical focus of an individual's research matters for subsequent location choices.

## Conclusion

- 22 As Europe increasingly converts to a knowledge economy, questions of brain drain and brain circulation become increasingly pertinent on policy makers' agendas. Bright students who leave Europe for graduate studies in the US may constitute an important loss of talent if these students choose to remain in the US, but may be a driver for European science and innovation if they return and bring home additional human capital and establish international knowledge spillovers. However, to date little is known about the return decisions of European students in the US, and how these decisions vary by nationality, personal and professional characteristics and over time. This study aims to contribute to expanding our knowledge of these topics, using a unique dataset that tracks the careers of almost 350 European students who obtain a PhD in economics in the US. Our dataset oversamples PhD holders who have published frequently. Although our sample is therefore not representative of the population of European graduate students in the US, it does constitute the sample of PhD holders who are bound to make the most valuable contributions to science and innovation .
- 23 We find that around a third of European PhD recipients in the US return to Europe, although there is considerable intra-EU migration upon return, as a third of returnees settle in another European country than their home country. Most return migration is immediate, i.e. students return for the first job after completion of the PhD, although some stay in the US for a few years of work experience and return later. For intra-European mobility, the UK is the preferred destination. Outside of Europe, Australia is the country most frequently moved to. The fact that both of these countries are

English-speaking indicates that moving costs are probably lower to places where the lingua franca of science is the native language.

- 24 From a policy perspective, there appear to be arguments for increasing funding available to European students who want to pursue a PhD in the US, and perhaps for tying this funding to a Europe-oriented research topic for their dissertation. Researchers who return home are significantly more likely to have received PhD funding from their home country compared to researchers who stay in the US, and are also significantly more likely to have used European data or studied a specifically European topic in their dissertations.
- 25 Although our study provides interesting new information on issues that are hotly debated within Europe, numerous gaps remain. First, as indicated our sample is not representative of all European students in graduate programs in the US. Our database covers only students in the field of economics, and oversamples PhD holders with many publications. Large scale studies should be undertaken to gather more representative data on the population of interest in adequate detail. Second, we only observe our sample's migration behavior, not the particular motivations and influencing factors that drive the observed flows of researchers, nor the effects these international movements bring about. To truly inform policy-makers on the optimal design of highly skilled migration policy, a lot more research is needed to assess the impacts, both positive and negative, from migration and return migration of tertiary students, and to discover what drives these migration decisions.
- 26 An important issue here is the ability selection of students who depart and students who return : are the most talented students more likely to leave the EU for graduate studies ? Are the brightest European students in the US more likely to stay, or more likely to return to Europe ? A follow-up study with these data by Van Bouwel and Veugelers (2011) addresses whether students with a PhD from a top university are more likely to stay in the US, and finds that students from top programmes are indeed more likely to stay, conditional on finding employment at a top institution. These issues merit increasing attention by scholars and policy makers alike, as the innovative capacity and therefore the welfare of regions will increasingly depend on their ability to attract creative brain power.

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## NOTES

1. See, for example, the EU's Communication on the EU2020 strategy ([http://ec.europa.eu/europe2020/index\\_en.htm](http://ec.europa.eu/europe2020/index_en.htm))
2. Gaughan (2007) and MacGarvie (2007) provide empirical evidence that the majority of students obtain their BA degree in their country of birth.
3. As some of the researchers in our sample receive a degree from a Canadian university, we have joined the US and Canada into a single higher education and research market, hence Canada does not figure as a separate "rest of the world"-destination.

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## ABSTRACTS

Although the EU has introduced various policies to foster student mobility within Europe, it remains a 'stylized fact' that the majority of student mobility is geared towards the US. Many students who choose to complete (part of) their higher education in the US may choose to stay there upon graduation, constituting part of the 'brain drain'. However, if a considerable part of these students return to Europe, bringing with them additional human and social capital, they may benefit the European economy. In this context, we study the migration behavior of a sample of European economics students who obtained a PhD in the US. First, we find a high stay rate : 64 % are currently working in the US, whereas only 24 % move back to their home country and an additional 10 % move to another European country. However, there are substantial differences in remigration patterns among different European countries and regions. The majority of returnees return immediately upon completion of their PhD degree, however, there is still considerable return migration of initial stayers up until the point where they likely receive tenure. Within Europe, the UK is the preferred destination for PhD holders who do not return to their home country. Finally, increasing funding for European students to pursue a PhD in the US may boost return rates, as PhD holders who were funded by their home country are more likely to return.

Hoewel de EU verschillende beleidsmaatregelen geïntroduceerd heeft om studentenmobiliteit binnen Europa te bevorderen, blijft het een algemeen aanvaard feit dat het merendeel van de studentenmobiliteit de VS als bestemming heeft. Veel studenten die (een gedeelte van) hun hogere studies in de VS afronden hebben de mogelijkheid om na hun afstuderen in de VS te blijven, en zo een deel van de 'brain drain' te vormen. Indien echter een groot aantal van hen terugkeren naar Europa, en daarbij additioneel menselijk en sociaal kapitaal met zich meebrengen, kan de Europese economie hier wel bij varen. In deze context bestuderen we de migratiebeslissingen van een steekproef van Europese economiestudenten die hun doctoraat in de VS behaald hebben. Ten eerste observeren we dat een hoog percentage verkiest in de VS te blijven : 64 % werkt momenteel nog steeds in de VS, terwijl slechts 24 % terugkeert naar hun thuisland, en een additionele 10 % zich elders in Europa vestigt. Ten tweede zien we dat de meerderheid van zij die momenteel thuis of in Europa werken, daar ook al werkten vlak na hun afstuderen. Binnen Europa is het Verenigd Koninkrijk de meest populaire bestemming voor doctoraatshouders die ervoor kiezen niet naar hun land van herkomst terug te keren. Ten slotte zijn er mogelijk argumenten om meer fondsen vrij te maken voor Europese studenten die in de Verenigde Staten hun doctoraat willen behalen, aangezien studenten die door hun thuisland gefinancierd worden meer kans maken om terug te keren.

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**Trefwoorden** studentenmobiliteit, internationale mobiliteit, brain drain, brain circulation, terugkerende migratie

**Keywords:** student mobility, international mobility, brain drain, brain circulation, return migration

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