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Brain Drain or Brain Gain? Graduate Migration in Old Industrial Regions - Analysis of the Central Lower Rhine Area, Germany

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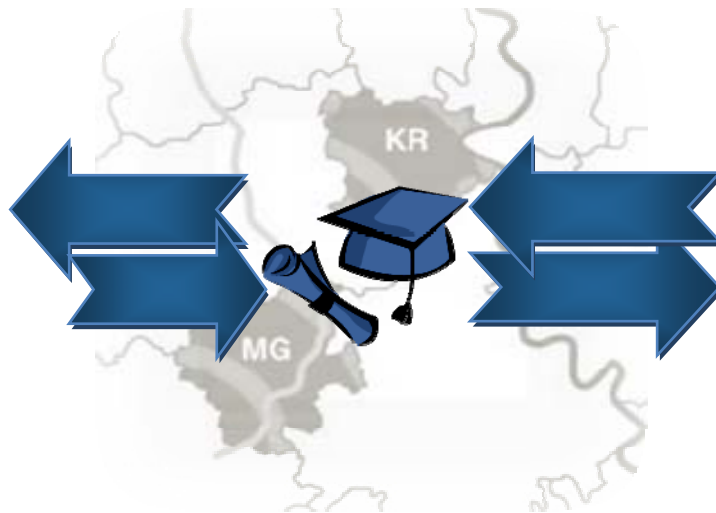
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Brain Drain or Brain Gain?

Graduate Student Migration in the Central Lower Rhine Area, Germany



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Abstract

The influence of tertiary education on the economic development of a region is a topic of special interest and prevalent object of studies and discussions of regional economists.¹ Universities are frequently referred to as “creative hubs”. Researching universities are generally expected to be one of the key institutions around which growth occurs, determining the direction of regional economic development. Especially the large number of highly-educated graduates is of eminent importance in terms of regional competitive advantages. If graduates remain in the university’s region, they form and enrich a highly educated labour force and support knowledge and innovation transfer from the university to the regional economy, networks, and enterprises.²

Human capital has traditionally been observed to be one of the most important resources of regions and one of the key factors explaining economic growth.³ In any economic region, gaining insights into the phenomenon of regional graduate migration and the determinants and reasons behind it is highly relevant for regional economic analysis and a prerequisite for policy recommendations. This holds especially true for regions with structural problems and low economic growth potential – as the Central Lower Rhine Area in North-Rhine-Westphalia, Germany, subject of this study. These regions depend on knowledge and innovation transfer from universities to overcome problems associated with industrial structural changes and market turmoil, and to face problematic trends as the forthcoming demographic development.

The research aim of this article is to analyse the migration of graduates in the Central Lower Rhine Area by assessing the regional ‘brain flow’ originating from the Niederrhine University of Applied Sciences (NR UAS), its only institution of higher education. More detailed objectives concern the assessment of the distribution of migration patterns, migration motives, graduate characteristics influencing the migration decision, and the comparison of actual migration patterns with migration preferences. Our results show that for the Central Lower Rhine Area, the associated regional brain drain resulting from graduate emigration cannot be compensated by extra-regional brain gain. A likely reason for this is a deficit of absorption capacity exhibited by the regional economy: A large proportion of graduates migrate due to difficulties finding an adequate job, or respectively, are attracted by economically better performing regions. Furthermore, econometric analysis identifies certain graduate characteristics influencing the migration decision. Remarkably, the migration decision is only marginally influenced by soft location factors like quality of living, regional image, or recreational amenities. Summarized, the research findings describe, interpret, and explain the regional graduate migration patterns and motives and indicate interesting implications.

JEL classification: I 23, O15

Keywords: University Graduates, Migration Patterns, Determinants and Motives, Alumni Network

1 Introduction

Universities and other institutes of higher education are a key competitive advantage for the regions they are located in. Regional effects from higher education institutions can generally be divided into

¹ Corresponding studies e.g. Anselin et al. 2000, Varga 1998, Hamm et al. 2012, Back / Fürst 2012, Florida 2004, Fromhold-Eisebith 1992, OECD 2011, Rosenfeld / Franz / Roth 2005, Reddy 2011, Schmoch 2011

² Audretsch et al. 2010, p. 105

³ E.g. Mellander / Florida 2007, p. 2; Rodriguez-Pose / Vilalta-Bufi 2004, p.1

expenditure- and supply-based impacts (figure 1). On the one hand, the university's own expenditure, but also the continuous consumption and spending of students and staff benefit the local production, employment and economy. These impacts are summarized as expenditure effects and resemble the effects observed for similar large expenditure-generating institutions.

Knowledge-based impacts of universities on the other hand benefit the population, the general economic development and innovation systems in their regional environment to a much higher extent.⁴ The regions profit from the universities' distinguished research efforts in future oriented branches, new international network connections, extensive public funding of research projects, and socio-cultural impacts, as the changing city atmosphere also to be described as a "creative buzz". Furthermore, universities may foster a rise of entrepreneurial activity leading to a higher rate of spin-offs and business start-ups in the region, and encourage societal and economic changes, as the level of entrepreneurial activity is strongly positively correlated with a variation in growth rates.⁵ In terms of knowledge transfer, the creation of new companies can furthermore be seen as a mechanism for commercialization of the academic intellectual property.⁶ Especially the high number of well-educated students graduating from the university is of high importance in terms of regional competitive advantages. The proportion of highly-skilled workers holding a degree of tertiary education among the regional population is thereby a key indicator for economic growth potential and human capital endowment. Graduates are also one of the key competitive factors for the region, as they transfer knowledge and innovation into the regional economy, networks, and enterprises. Especially for small and medium sized enterprises (SME) they are of high importance, as most of them have no research and development department and are therefore dependent on knowledge transfer from higher education institutions. Applying this knowledge transfer, entrepreneurs can gain a comparative advantage. Summing up, universities and especially their graduates are a key benefit and a competitive advantage on a micro level – for the firms – but also on a broader level for the regional economy and the community.⁷

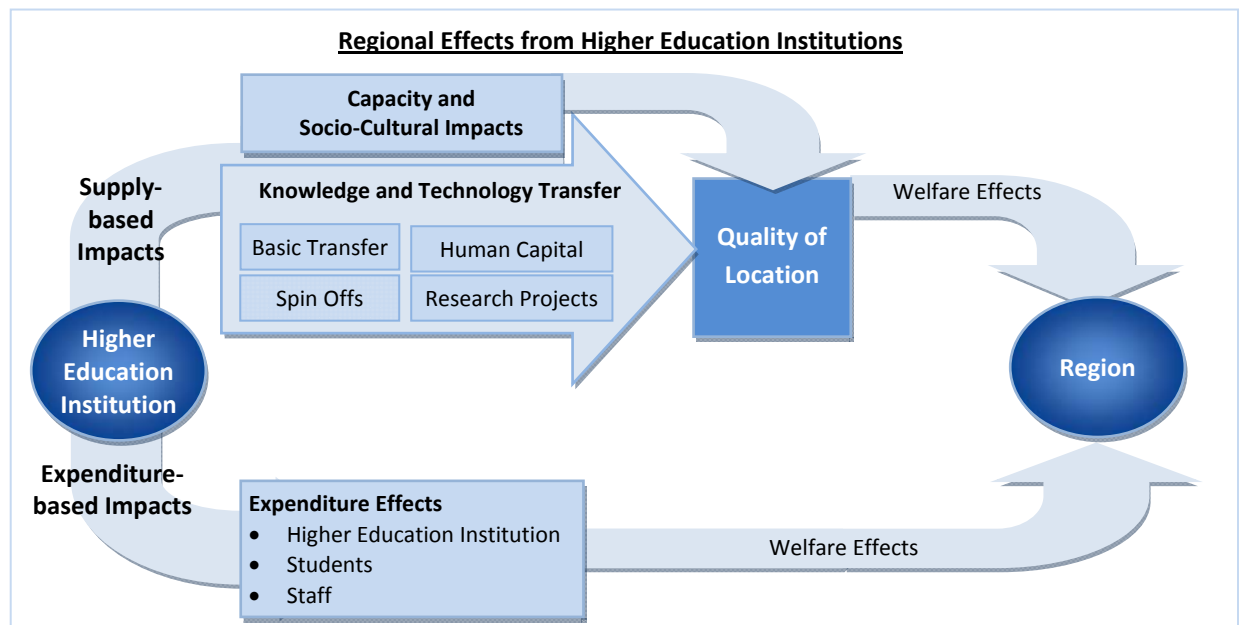


Figure 1: Regional Effects from Higher Education Institutions. Source: Hamm et al. 2012, p. 44

⁴ Niederrhein University of Applied Sciences 2012, p. 38

⁵ Acs / Armington 2004, p. 1

⁶ Siegel / Wright / Lockett 2007, p. 489

⁷ Jäger / Kreutzer 2011

On a macroeconomic level, the conducted analysis is also of supra-regional and national importance, as the patterns of regional brain flows and the motives and reasons behind it are key indicators for economic growth potential and the development of human capital. For the Central Lower Rhine Area on the other hand, it is of high importance to gain insights into the phenomena of regional graduate migration. Using a unique threefold data set covering migration patterns and motives of graduates of the Niederrhine University of Applied Science (NR UAS) and students in their final semester, the article takes a closer look at the associated human capital effects for the Central Lower Rhine Area.

In the following chapter, a more detailed exposition of the regional background and the underlying methodological and empirical framework of the study will be given. Subsequently, the empirical results are presented. It will be analysed how many students leave the region after their graduation, in which radius the graduates tend to migrate, and how many of the graduates continuously reside in the university region. Combined with information about the students' geographical origin, migration patterns are derived and compared. Additionally, we offer interesting insights into the plans and motives influencing the decision of staying in the region respectively migrating to another. Another question to be assessed is who stays and who migrates – or put into more academic words– which graduate characteristics influence the migration decision positively or negatively. Does the probability to migrate of a certain type of graduate (e.g. considering the student's field of study) vary from the average? Is there a correlation identified between the student's final mark indicating study success and the decision to reside in the university region? Furthermore, the process of job application will be analysed. We examine how long it took the students to find a job, and assess the income graduates receive after their career access. These classifications are differentiated with the regional background in mind. Obviously, there are several highly relevant research questions to be assessed concerning the topic of graduate migration. Combining the gathered information about migration patterns, plans and motives, possible strategy implications will be identified.

1.1 Bearing the regional background in mind: The Central Lower Rhine Area

This article focuses on the geographic district of the Central Lower Rhine Area, a region in North-Rhine-Westphalia, Germany. The Central Lower Rhine is a functional region rather than a district marked by official borders, the research area was therefore limited according to the boundaries of the chamber of commerce and industry (*Industrie- und Handelskammer, IHK*) and encloses the administrative districts of Viersen, Krefeld, Neuss and Moenchengladbach (figure 2).



Figure 2: Central Lower Rhine Area in North-Rhine-Westphalia, Germany (adapted from *IHK Mittlerer Niederrhein*, 2012)

The Central Lower Rhine Area is a traditional industrial region, historically focused on the textile industry. In the last decades, the area faced severe structural changes and suffered from adjustment problems. A sufficient supply of highly educated human capital would be a critical success factor for the region to achieve higher economic growth rates and excellence in modern growth industries. Instead, a shift-share-analysis conducted by the Niederrhine Institute for Regional and Structural Research⁸ reveals two facts. First, the area surrounding the NR UAS focuses especially on industry branches that employ a relatively low percentage of tertiary educated workers in comparison to the overall percentage of graduates employed in all industries. Second, even considering the focus on industry branches with a low percentage of academics, the regional economy demonstrates a below-average percentage of university graduates employed. The undersupply of highly qualified human capital in the area is aggravated by a tremendous “pull-factor” incorporated by the nearby Rhine-Ruhr-Metropolitan areas (Aachen, Dusseldorf, Cologne, Bonn, Essen, Dortmund) with economic clustering, modern urban infrastructure, and distinguished potential for economic growth. These attractive metropolitan areas benefit from much better conditions to attract external, highly qualified graduates. This was also demonstrated by a conjoint analysis conducted by the IAT (*Institut für Arbeit und Technik*) in 2012. The IAT analysed the attractiveness of economic regions in NRW for graduates, revealing that the employment markets in the geographic neighbourhood of the Central Lower Rhine Area (*Region Niederrhein*) are of recognizably higher attractiveness, and hence strong competitors for human capital. This situation, in fact, is typical for a peripheral region close to metropolitan areas that suffers from adjustment problems to structural changes. Therefore, the results of this study are also of high importance to similar regions.

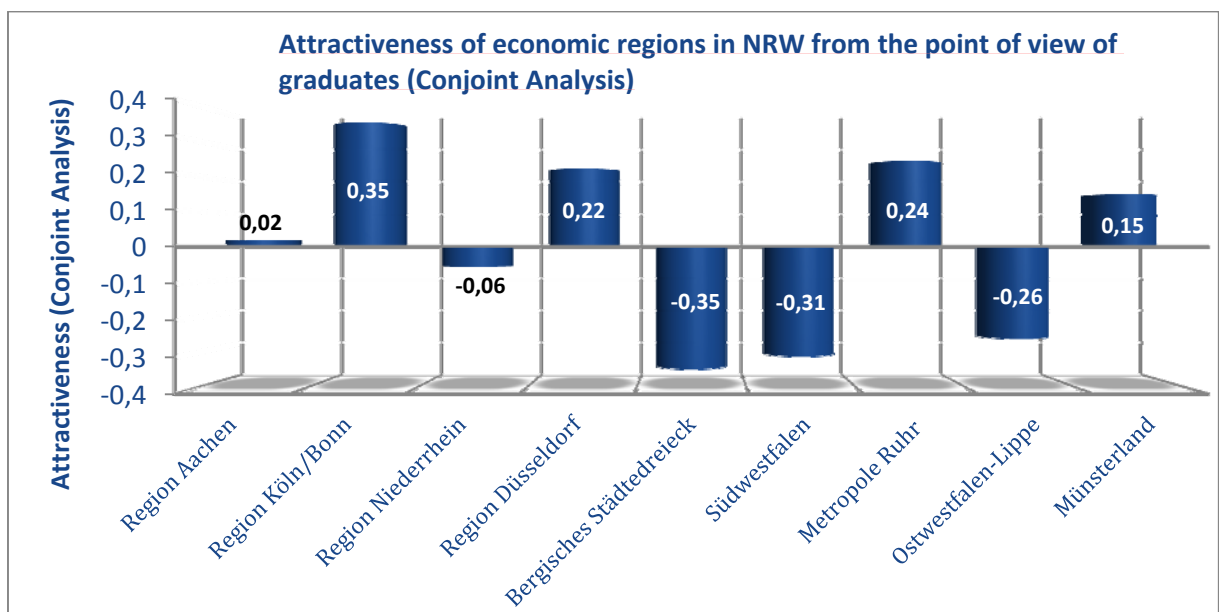


Figure 3: Own figure, data basis IAT 2012, p. 9

According to the described situation, 38% of the companies situated at the Central Lower Rhine complain about a shortage of skilled labour in 2012 – more than in 2011.⁹ Especially companies with more than 500 employees criticise problems in finding skilled employees. Additionally, the analysis found out that 24.8% of the surveyed companies expect a rising demand for skilled employees in the next three years. A high number of well-educated students graduating from the regional university

⁸ © NIERS; for further information contact the authors

⁹ IHK 2012, p.2

(Niederrhine University of Applied Sciences, NR UAS), who also start to work in the local industry, would hence be of special importance for the Central Lower Rhine Area.



Figure 4: Shortage of skilled labour at the Central Lower Rhine Area; adapted from IHK 2012, p.2

1.2 Methodology

This article presents the results of a study of graduate migration patterns and motives that was conducted for the NR UAS in 2011 based on a unique threefold data set. In the following, a more detailed exposition of the underlying methodological framework of the study as well as a short presentation of the database are given. The information assessed is based on a combination of the following three data ascertainties. Firstly, an official paper-based questionnaire that is sent to recent graduates in a two-year-rhythm is evaluated.¹⁰ For this article, the survey of 2012 comprising 1,769 survey participants was analysed. Secondly, in late 2011, an online-questionnaire was sent to more than 3000 graduates, who are actively engaged in the alumni networks of the university. The response rate was 15.8%, resulting in a data set of 475 participants. The third analysed data set consists of 239 students in their final semester. Although this data set is not representative, as only students in the faculties of one university location were surveyed, it is very valuable. By analyzing this dataset, it was possible to evaluate the difference between student's migration preferences and plans concerning their choice of job shortly before their final exams, and to compare it with the reality, the final realization of their plans after the graduation.

To describe and analyse the dispersion of graduate migration, several models of migration patterns are used in academic literature.¹¹ This article will apply a distinction of graduate migration movements into four groups: *Non Migrants*, *Late Migrants*, *University Stayers* and *Repeat Migrants*.

- **Repeat migrants:** This group comprises students, who leave their region of secondary education to study in another region. Finishing their studies, they leave the area surrounding their university to start their first job in another employment area.

¹⁰ Survey is regularly conducted by the NR UAS; data could be analysed based on support of NR UAS

¹¹ Eg. in Hell et al. 2011, p.15; Spehl et al. 2006 p. 27;

- University Stayers: This group leaves the region of secondary education to attend a university in another region, as well. But contrary to the *Repeat Migrants*, they stay in that region after graduation to start their professional life.
- Late Migrants: Late Migrants are graduates who start to study in the region of their secondary education, but leave this area for their first job after graduation.
- Non Migrants: This group of graduates starts to study in their home region and eventually stays after graduation to work in the local industry.

Figure 5 illustrates this migration framework including the geographical references to the research area Central Lower Rhine.

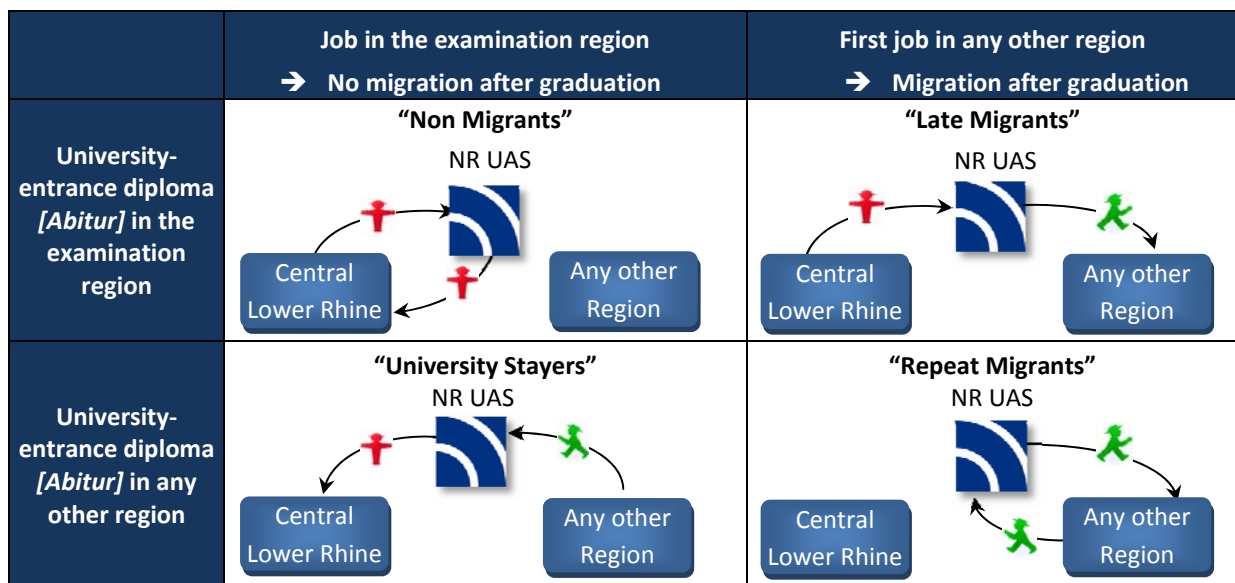


Figure 5 – Migration Patterns. Source: Kreutzer / Jäger 2011

Based on literature review and theoretical considerations, the three surveys focus on the following graduate characteristics, to assess information about migration patterns and motives:

a. Individual-Related Variables

- Geographic Origin: In which region has the graduate received the university entrance diploma?
- Apprenticeship: Has the graduate finished an apprenticeship?
- Age: How old was the graduate when finishing his studies?

b. Study-Related Variables:

- Field of Study: In what faculty did the graduate study?
- Study Success: What final overall mark did the graduate receive?
- Temporary Stay Abroad: Has the graduate spent a stay abroad (at least 4 months) during the study, which was related to the field of study?

c. Variables related to the Working Life:

- Duration of Job-Seeking: How long did it take graduates to find an adequate job after graduation?
- Knowledge of Local Economy: How well did the graduate know possible employers in the region?
- Duration of Job Application: How did the graduate find / apply for the first job after graduation?
- Job Contract: Under what conditions was the graduate employed in the first job after graduation?
 - o Fixed-term employment contract / permanent employment contract
 - o Salary
 - o Part-time job / Full-time job

- Self-employed / employee / civil servant
- Company Size: How many workers are employed at the graduate's current employer?
- Branch: In what branch does the graduate's current employer operate?

The examination was conducted with basic empirical analysis mostly, enabling conclusions about migration patterns, motives, and about certain graduate characteristics influencing the probability of the graduate staying in the Central Lower Rhine Area for the first job after graduation. Furthermore, econometric analysis was carried out to verify the findings and the validity of the results. In the following, the study's overall findings will be presented and illustrated.

2 Results

2.1 Migration Patterns

The Niederrhine University of Applied Sciences (NR UAS) was founded in 1971 and is situated in Krefeld and Moenchengladbach; it is the only public university in the focused research area. In 2012, it is endowed with 12,002 students, 233 professors, and 22 research institutes and centres.¹² The NR UAS is one of the biggest universities of applied sciences in Germany. Every year, hundreds of graduates leave the university – a high potential of human capital and knowledge transfer for the Central Lower Rhine Area. Figure 6 illustrates the rising number of graduates finishing their studies at the NR UAS between 2001 and 2009 in comparison to the average number of graduates of universities in NRW and Germany.

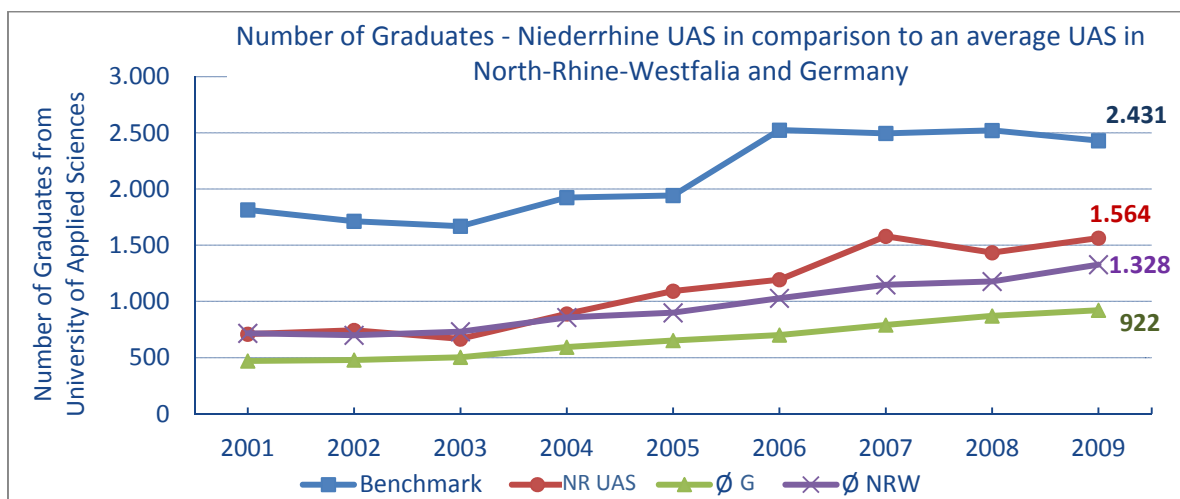


Figure 6: Number of NR UAS graduates in comparison to an average UAS in the federal state of North-Rhine-Westphalia (NRW), respectively Germany (G). Data Base: Federal Statistics Office (Statistisches Bundesamt), 2003 – 2011. Benchmark value is assigned to highest number of graduates leaving a university of applied sciences in Germany in the respective year.

An examination of the geographical location of the graduates' job entrances is of critical importance to assess how successfully knowledge transfer from NR UAS to the Central Lower Rhine Area is accomplished, and of how much importance the university and its graduates are for the region. Do graduates start to work in the Central Lower Rhine Area or do they migrate to nearby regions with a more attractive employment market - especially considering the nearby metropolitan areas? Bearing the importance of the geographical aspect of the main research questions in mind, the graduates of

¹² Niederrhein University of Applied Sciences 2012, p. 8

the sample are separated into four migration groups, as presented earlier: *Repeat Migrants*, *University Stayers*, *Late Migrants*, *Non Migrants*.

The migration patterns exhibited in table 1 illustrate that 30.5% of the NR UAS graduates originally come from the Central Lower Rhine Area (respectively, they received their university entrance certificate in that region). On the other hand, only 26.5% of all graduates start to work in the area after their graduation, which leads to a loss of human capital – a brain drain – of 4.0%. The share of graduates to be identified as *Late Migrants* (15.5%) is noticeably bigger than the group of the *University Stayers* (11.5%). Hence, the share of regionally originated graduates, who start their professional life on external employment markets, is bigger than the external human capital that was attracted to the Central Lower Rhine Area via the NR UAS. The analysis of the second survey, the alumni network online-survey, even reveals a brain drain of 24.3%. The difference stems from the fact that in the official graduate survey, graduates are questioned two years at most after their graduation, whereas the alumni network online-survey questioned graduates of all age groups, many of them having finished their studies a longer time ago – which leaves a longer time, respectively a higher probability for them to migrate. Furthermore, unfortunately it is to be assumed that an unclear phrasing of the question asking for the graduates' origin in the graduate survey leads to a marginal underestimation of the share of graduates originated at the Central Lower Rhine Area. Summarized, a brain drain of human capital can be identified for the NR UAS that ranges between 4 - 24%, depending on the survey and taking into account the mentioned explanations.

Table 1: NR UAS-Migration Patterns for the Central Lower Rhine Area, 2012; survey of graduates

	First job Central Lower Rhine	First job: any other region	Σ
Origin: Central Lower Rhine Area	Non Migrants 15.0 %	Late Migrants 15.5 %	30.5 %
Origin: Any other region	University Stayers 11.5 %	Repeat Migrants 58.0 %	69.5 %
Σ	26.5 %	73.5 %	100

Table 2: NR UAS-Migration Patterns for North-Rhine-Westphalia (NRW), 2012; survey of graduates

	First job in NRW	First job: any other region	Σ
Origin: NRW	Non Migrants 68.0 %	Late Migrants 14.6 %	82.6 %
Origin: Within rest of Germany	University Stayers 6.5 %	Repeat Migrants 10.9 %	17.4 %
Σ	74.5 %	25.5 %	100

Source: Survey of graduates 2012, N = 1769, data ascertainment of NR UAS 2012, data analysis © NIERS

Additionally, the migration patterns considering the federal state of North-Rhine-Westphalia (NRW) were analysed and illustrated in table 2. This approach is of importance, as in Germany, universities are generally financed by the federal state. Therefore, it is interesting to see whether the federal state of NRW is rather an exporter and service provider of higher education, or an importer. Considering the migration patterns of NRW, the trend of a brain drain that was discovered at the regional level, is recognizable as well at the state-level. 82.6% of the NR UAS graduates finished their secondary education in NRW, whereas 74.5% of the graduates start their first job in NRW.

From 1990 to 2005, a nationwide analysis of graduate migration was conducted¹³ considering graduates who finished their studies in this time span. This study enables a comparison of the NR UAS migration patterns of NRW (table 2) with nationwide figures.¹⁴ The nationwide study shows that on

¹³ Minks / Fabian 2011; study conducted by the *Hochschul-Informationen-System GmbH HIS* in 2007

¹⁴ Although topic and applied migration patterns are identical, it has to be taken under consideration that for the two studies different sample sizes, enquiring periods, and methodology were applied, which lowers the comparability.

average 66% of the German graduates originate from the federal state they studied in (NR UAS: 68%). 34% of all German graduates leave the federal state they studied in after their graduation to start their professional life in another federal state (NR UAS: 25.5%), whereas 66% start to work in the federal state they studied in (NR UAS: 74.5%).¹⁵ First of all, these figures prove that the NR UAS has an exceptionally regionally oriented catchment area for their first semester students – which is important, as local graduates exhibit a much lower probability to migrate than foreign graduates. Furthermore, the share of NR UAS graduates, who migrate to another federal state to start their working life, is clearly below average (Ø Germany: 34%, NR UAS: 26.5%). A likely explanation is the large size, attractive employment markets and consequently high quantity of jobs available in the federal state of NRW. Also, the figures suggest that the share of migrating NR UAS graduates is rather average, but as a very high proportion of the graduates are also originated from the area, the NR UAS exhibits a brain drain. The low proportion of University Stayers (Ø Germany: 13%, NR UAS: 6,5%)¹⁶ furthermore indicates a relatively low attractiveness of the regional employment market for external students.

Table 3: NR UAS-Migration Patterns for the Central Lower Rhine Area, 2011; survey of students

	First job: Central Lower Rhine	First job: other region	Σ
Origin: Central Lower Rhine	Non Migrants 14.5 %	Late Migrants 21.1 %	35.7 %
Origin: Any other region	University Stayers 5.7 %	Repeat Migrants 58.6 %	64.3 %
Σ	20.3	79.7	100

Source: © NIERS; Survey of students in final semester, N = 239

Analysing the migration plans of NR UAS students in their final semester (table 3), the proportion of students wanting to start their professional life in the regional surrounding is 20.3%. This means, more graduates actually stay in the area (26.5%) than their plans indicate (20.3%). Remarkably, the official survey of graduates furthermore reveals that 64% of those graduates, who actually leave the Central Lower Rhine Area for their first job would have remained given a better job offer.

Further analysis of the survey of students shows that the actual migration preferences are roughly comparable to the results of the other surveys. This underlines that for many students the decision to stay in the region or migrate to other employment regions after their graduation is already made during their studies – before they start applying for jobs. This suggestion is approved by the fact that 39% of the graduates found their first job due to a connection made during the studies (figure 7).

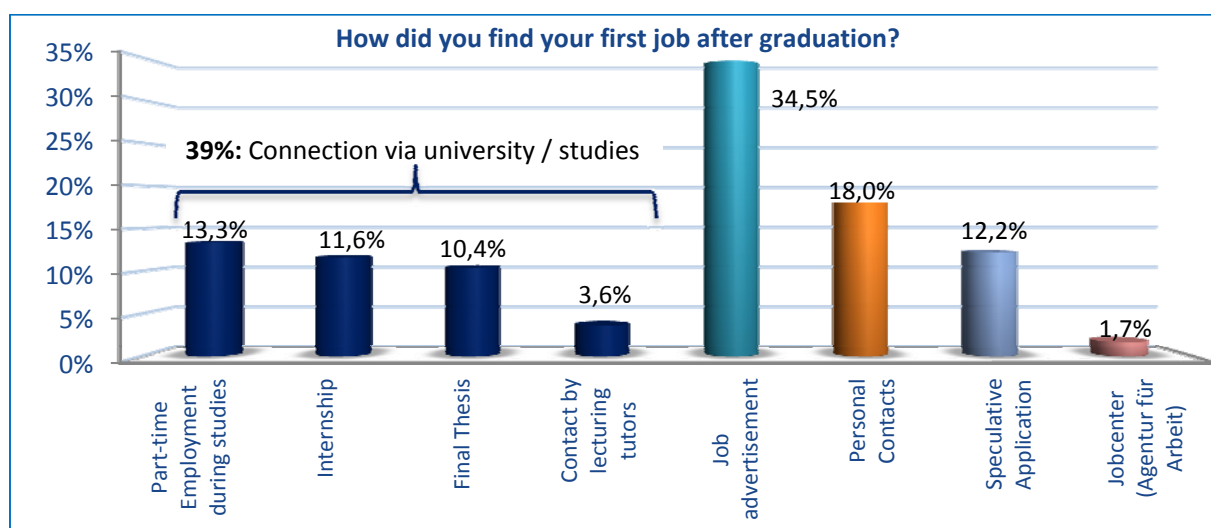


Figure 7: Survey question “How did you find your first job after graduation?” Data Base: Survey of graduates 2012, N = 1769

¹⁵ Minks / Fabian 2007, p. 36

¹⁶ Minks / Fabian 2007, p. 36

2.2 Variables and Characteristics influencing the Migration Decision of Graduates

Next to migration patterns, graduate characteristics and their influence on the probability of graduates staying in the region or migrating to other regions after graduation are analysed. Some variables do not have any clear influence on students' migration decision after graduation¹⁷: *diploma entrance certificate, age, study success, company size and branch*. Although it might be argued that the most successful students receive the best job offers from employers from varying distances, and that a high salary acts as a "pull-factor", no relationship between study success and migration patterns is detected. This fact is supported by similar studies in academic literature: the final grade is of no influence on the migration decision.¹⁸ Also, whether graduates work in *self-employment, as employees, or civil servants* has no influence on the migration decision. This is interesting, as academic literature argues that students' spin-offs and business start-ups are often located in close distance to universities, as entrepreneurs use their existent network connections.¹⁹ This theory is not supported by our data. Concerning the variable *apprenticeship*, the graduate survey shows that 52% of the NR UAS graduates have finished an *apprenticeship*. Furthermore, in 2012, 6.5% of all students are enrolled in dual study programmes, where students accomplish an apprenticeship and a bachelor degree at the same time. Whereas it could be expected that these students have excellent contact to local employers and therefore might be especially prone to start their professional life in the regional surrounding, the data indicate that this is not the case. Nonetheless, for several other variables and characteristics, interesting results are verified, which will be presented in the following.

Field of Study: The probability of graduates staying in the region or migrating to other regions after graduation varies considering different faculties (figure 8). In some faculties, a positive brainflow-balance was assessed, especially in the faculties *Applied Social Sciences* and *Health Care Management*. Literature analysis underlines that these results resemble similar studies.²⁰ A nationwide study of graduate migration found out that graduates of Social Sciences prefer to stay in their university region, whereas graduates of Economics are especially prone to migrate after graduation.²¹ Furthermore, the NR UAS study indicates that graduates from the most specialized and uncommon faculties (Textile and Clothing Technology, Design) exhibit a high propensity to migrate.

	Chemistry	Design	Electrical Engineering, Computer Science	Mechanical and Process Engineering	Food, Nutrition and Hospitality Sciences
Origin Lower Rhine Area (%)	22.8	25.4	39.7	34.1	24.5
Start of professional life in a company in the Lower Rhine Area (%)	20.3	11.8	22.4	38.1	29.2
Brainflow-Balance (%)	-2.5	-13.6	-17.3	+4.0	+4.7

	Applied Social Sciences	Textile and Clothing Technology	Business Administration / Economics	Industrial Engineering	Health Care Management
Origin Lower Rhine Area (%)	30.3	9.2	42.2	42.4	24.0
Start of professional life in a company in the Lower Rhine Area (%)	42.1	9.9	26.5	27.7	32.2
Brainflow-Balance (%)	+11.8	+0.7	-15.7	-14.7	+8.2

Figure 8: Migration patterns for the different faculties. Data Base: Survey of graduates 2012, N = 1769

¹⁷ Respectively, the results could not be verified by at least two survey's results

¹⁸ Vgl. Spehl et al. 2006, S. 29; Hell et al. 2011, S. 29

¹⁹ Vgl. Fritsch et al. 2007, S. 28.; Egelin et al. 2003, S. 42.

²⁰ Vgl. Fabian / Minks 2008, S.5; Falk / Kratz 2009, S. 55

²¹ E.g. Mohr 2002

Temporary Stay Abroad: It might be argued that a temporary stay abroad lowers the graduates' inhibition threshold to migrate after graduation. Our analysis suggests in contrast that a temporary stay abroad during the studies does not influence the migration propensity. Whereas among the graduates who experienced a temporary stay abroad, 20.7% resided in the region for the start of professional life, 20.9% of graduates without experience abroad stayed in the region.²² Nevertheless, international experience raises the distance range of migrating graduates. The proportion of graduates who migrate to a further distance than NRW (within the rest of Germany or Europe) is higher for those graduates who stayed abroad during their studies.

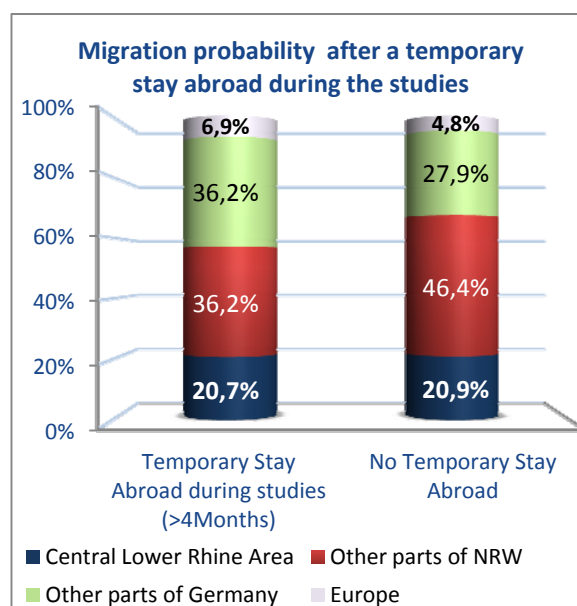


Figure 9: Migration probability after a temporary stay abroad.
Data Base: Survey of alumni network 2011, N = 475

Knowledge of Local Economy: The knowledge of the local economy and possible future employers among the graduates is of interest, as it might be expected that the better a student knows the local economy and relevant employers, the higher the probability of this student staying in the region after graduation might be. The NR UAS graduates have a varying knowledge about the regional economy and possible future employers; 25.9% claim to have complete or good knowledge, 33.5% express medium knowledge, and 40.5% of the questioned graduates have no or hardly any knowledge about relevant employers in the Central Lower Rhine Area. The graduate survey also questioned the graduates who left the region about whether they would have stayed in the Central Lower Rhine Area, if they had received a better job offer (table 4). 64% of the graduates who have left would have stayed in the regional economy given a good job offer. The question is to be raised, if the local economy simply cannot compete against of the employment markets in the successful nearby metropolitan areas, or if the students simply didn't know the local job possibilities. Table 4 shows that those graduates interested in staying in the Central Lower Rhine Area seem to be better informed about the local economy and possible employers. Nonetheless, there is a large group of graduates, who left the region, wanted to stay, but simply did not know the possibilities of the local job market (area shaded grey in table 4).

		Knowledge of local economy and possible future employers					
		Complete knowledge	2	3	4	No knowledge at all	Total
If I had received a better job offer, I would have stayed in the Central Lower Rhine Area	Yes	14 2.8%	128 25.5%	159 31.7%	138 27.5%	62 12.4%	501 100%
	No	10 3.6%	37 13.2%	89 31.7%	85 30.2%	60 21.4%	281 100%
Total number of students, who migrated to other regions after their graduation		24	165	248	223	122	782

Table 4: Migrating Graduates' knowledge about relevant regional employers? Data Base: Survey of graduates 2012, N=1769

²² As the question of a temporary stay abroad was not addressed in the graduate survey, the information was confirmed by the surveys of the alumni network and the NR AUS students in their final semester.

Duration of Job Seeking: A connection was detected between the duration of finding an adequate job and the migration probability. Figure 10 underlines that if graduates seek a job offer for longer than three months, the propensity of them starting their professional life at the Central Lower Rhine lowers considerably. A possible explanation is that graduates might first apply for job offers in the region with the lowest migration costs; if they do not find an adequate job within three months, they might be more willing to expand their application range. Although the figures indicate a connection, a clear linear relationship cannot be defined.

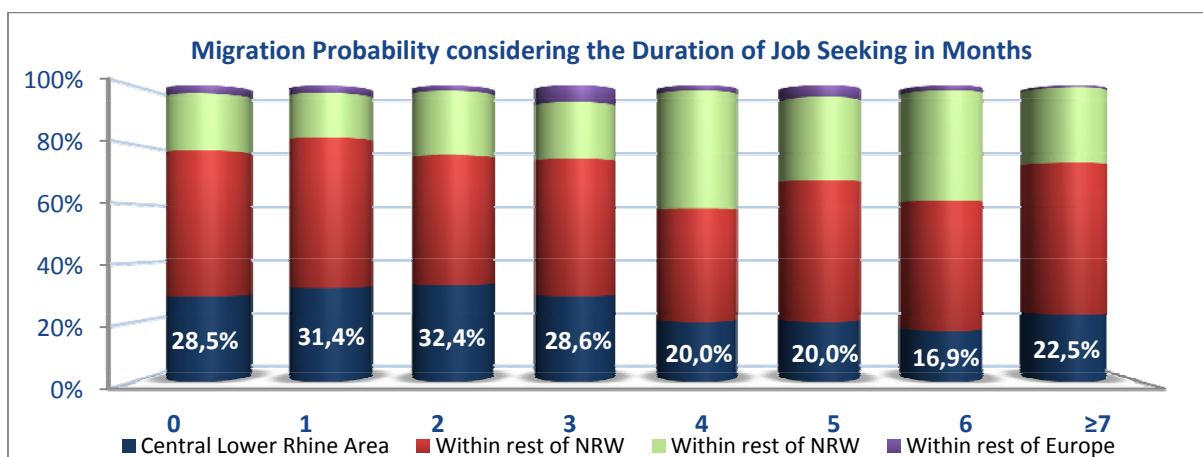


Figure 10: Migration probability considering the duration of job seeking in months. Data Base: Survey of graduates 2012, N = 1769

Starting Salary: A relationship between the graduates' starting salary and their migration probability could be detected for very high starting salaries. Figure 11 shows that from the starting salary of 3000€ upwards, there is a decreasing probability that graduates start their professional life in the Central Lower Rhine Area. Again, this connection is not a strictly linear relationship. Nevertheless, academic literature claims that a very high starting salary can act as a "pull-factor" and is a valuable reason for graduate migration.²³ However, real wages in the Central Lower Rhine Area are considerably lower than the national average; hence, migrating graduates might simply receive a higher salary that is in balance with regional standards of their employment market. The causality of this relationship cannot undoubtedly be determined. Additionally, especially for the highest salaries sample sizes were relatively low, therefore the results should be regarded with cautiousness.

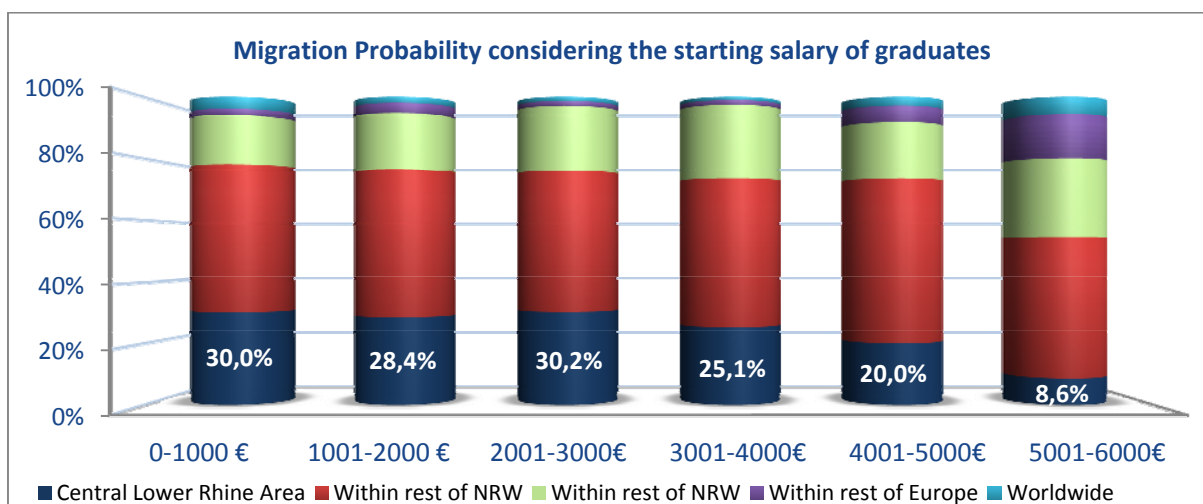


Figure 11: Migration probability considering the starting salary of graduates. Data Base: Survey of graduates 2012, N = 1769

Salary of 0-1000€: N = 53; 1001 – 2000€: 150; 2001 – 3000€: N = 499; 3001-4000€: N = 453; 4001 – 5000€: N=138; 5001-6000€: N = 38

²³ Vgl. Hell et al. 2011, S. 33.

Form of Job Contract: Furthermore, a connection between the form of job contract and graduate migration is identified. A desirable job contract for a graduate seeking an entry into professional life is hereby identified as a permanent employment contract for a full-time-job. Considering these job characteristics, the probability of a migration to external employment markets is noticeably higher. For graduates with fixed-term employment contracts and part-time jobs, the propensity to remain at the Central Lower Rhine is respectively higher (figure 12). A possible explanation is that graduates might be willing to accept less attractive job contracts if their migration cost are low.

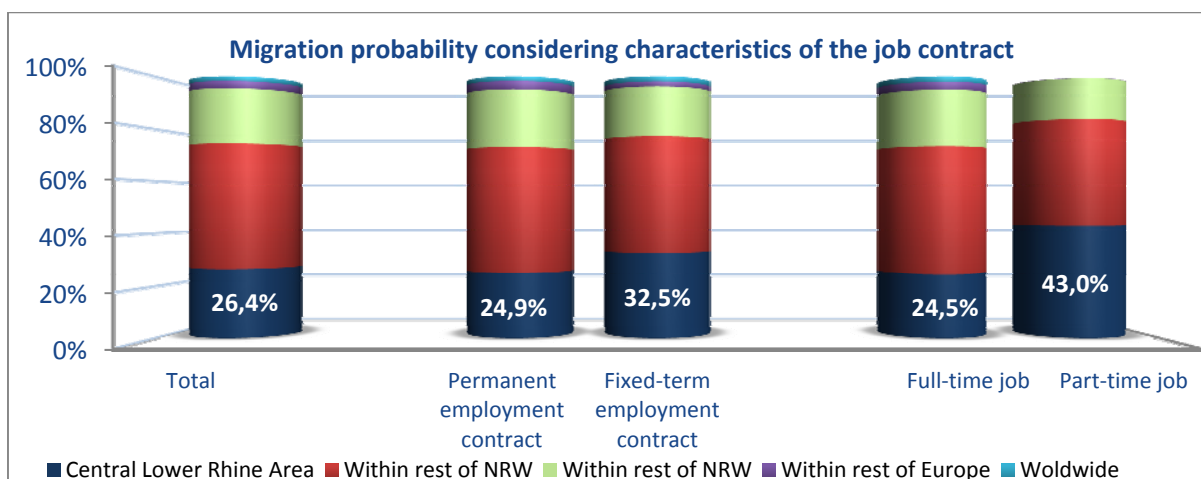


Figure 12: Migration probability considering the duration of job seeking in months. Data Base: Survey of graduates 2012, Total N = 1769; Permanent employment contract N = 1033, Fixed-term N = 319, Full-time employment N = 1291, Part-time N = 149

2.3 Migration Motives

To find out how human capital can be attracted to the Central Lower Rhine, and how the regionally exhibited shortage of highly-qualified workers can be antagonized, it is essential to understand, what motives drive the decision of graduates whether to work in the region or to leave for external employment markets. This study divides the migration motives into reasons for starting a professional life at the Central Lower Rhine Area, and motives for migrating to other areas. Consequently, the answers of graduates who left the area are differentiated from the answers of graduates who start their first job at the Central Lower Rhine. The results are exhibited in figure 13.

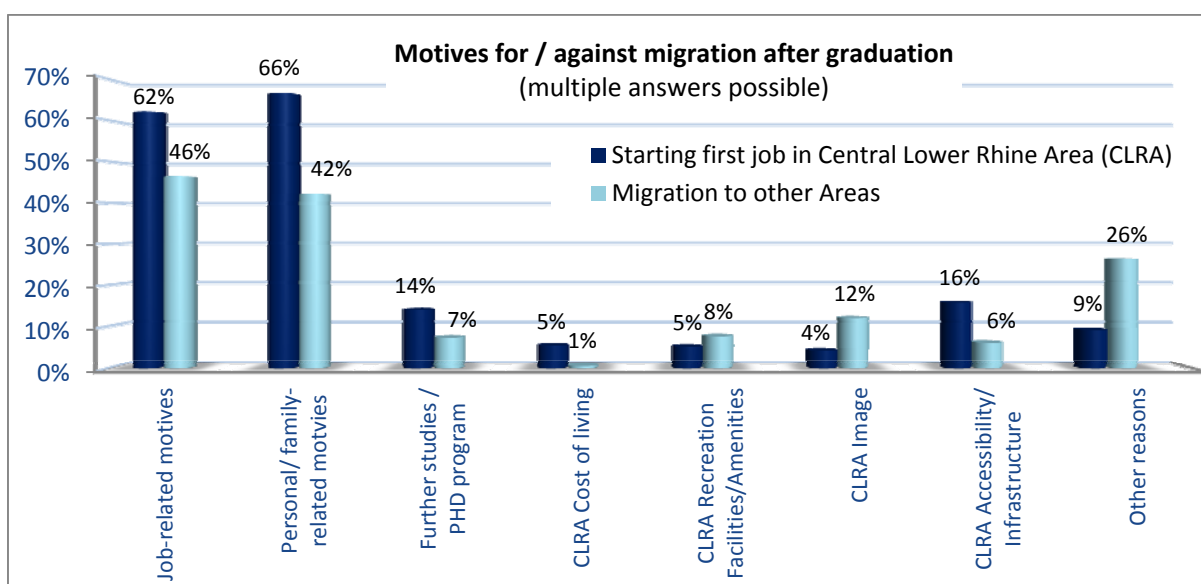


Figure 13: Motives for / against migration after graduation. Data Base: Survey of graduates 2012, N = 1769

The motives that clearly determine graduates' migration decisions are job-related and personal / family-related motives. Hence, graduates stay in the region mostly because they either found an adequate job or because they want to remain close to family and friends. Graduates, who migrate to other employment regions mostly do so because they did not find an adequate job or received a better job offer in other regions, or they leave due to personal and family-related reasons. These two motives – job-related and personal and family-related motives – are the only ones that generally seem to be of high importance in the graduates' decision making process. Interestingly, soft location factors as recreation amenities, cost of living, image, and accessibility and infrastructure seem to be a minor motive in the migration decision for most graduates. Nonetheless, location factors that rather speak in favour of staying at the Central Lower Rhine are the below-average cost of living, the accessibility and infrastructure, and the possibility to start further study programs at the NR UAS. Location factors that are rather a reason to leave the Central Lower Rhine are its image and a lack of attractive recreation facilities and amenities.²⁴

In further analysis, special attention is focused on the graduates who start their first job at the Central Lower Rhine. The data is divided considering the groups of *University Stayers* and *Non Migrants*. Both groups are of special importance. It is essential to understand, what convinces *University Stayers* to stay after their graduation, as they stand for the external human capital that could be attracted to the Central Lower Rhine Area due to the NR UAS. The *Non Migrants* represent the regionally originated and educated high potentials, who also stay at the Central Lower Rhine after their graduation. It might be argued that these students are of special importance for the regional economy, as their willingness to start the professional life in the region is considerably higher – for local companies, it might be much easier to convince these graduates to stay on a long term basis.

Table 5 displays the results of an analysis of *University Stayers* and *Non Migrants* and compares these groups with the answers of all survey participants. The results show that both examined groups had found an adequate job more often than the average graduate at the time of the survey. Also, graduates who start to work at the Central Lower Rhine Area seem to find their jobs very quickly, and more often without writing any applications. Furthermore, table 5 clarifies that the NR UAS and activities during the time of studies played an important role in connecting these graduates with their future employers. Hence, the analysis supports the thesis that a very important motive for graduates to start their professional life at the Central Lower Rhine is that an adequate job was easily and quickly found, often via contacts the graduates made during their studies or by activities of the NR UAS. Especially for *University Stayers*, who show a below-average knowledge of possible regional employers, the role of the NR UAS as an employment broker seems to be of high importance. *Non Migrants* on the other hand demonstrate more own efforts in the stage of job application and a better knowledge about the regional economy and possible future employers. Concerning the form of job contract, both groups accept job contracts that have a comparably lower attractiveness (part-time employment, salary < 3000€) more often than the usual graduate (as was already indicated in figure 12).

Furthermore, it is of interest that the group of *Non Migrants* displays a noticeably above-average proportion of self-employed graduates – indicating that it might not only be the close proximity to the university, but to the personal and professional networks that define the working residence of spin-offs and business start ups by graduates.

²⁴ Graduate survey 2012, n = 1769

Variable		All survey participants	University Stayers	Non Migrants
Already found adequate employment		81,3%	95,6%	100%
Duration of Job-Seeking: 0 Months		48,6%	54,8%	48,5%
Self-Employed		6,5%	3,1%	8,7%
Form of Job contract:	Part-time employment	10,3%	15,6%	16,7%
Attractiveness below average	Salary < 3000€	51,73%	62,2%	55,2%
How did you find your first job after graduation?		All survey participants	University Stayers	Non Migrants
Contact to future employer during studies/ via university	Part-time employment during studies	13,3%	26,9%	22,5%
	Internship	11,6%	14,4%	16,7%
	Final Thesis	10,4%	19,4%	12,4%
	Contact by lecturing tutor	3,6%	14,4%	3,3%
	Total:	38,9%	75,1%	54,9%
Graduates' efforts in stage of job applications	Job Advertisement	34,5%	28,1%	34,9%
	Personal contacts	18%	20,0%	29,7%
	Speculative Application	12,2%	14,4%	16,7%
	Total:	64,7%	62,5%	81,3%
Knowledge of regional economy / possible employers		33,8R	25,9R	34,3%
If you have had a free choice, which place of residence would you have chosen at the time of your graduation? High preference for...		All survey participants	University Stayers	Non Migrants
Central Lower Rhine Area		53,0%	58,6%	88%
Within rest of North-Rhine-Westphalia		43,5%	50,0%	25%
Within rest of Germany		35,3%	40,7%	27,5%
What were your motives to start your professional life in the Central Lower Rhine Area?		All survey participants	University Stayers	Non Migrants
Job-related motives		62%	80%	80,9%
Personal and family related motives		66,49%	64%	76,6%
Cost of Living		5,29%	3,8%	3,3%
Recreation Facilities / amenities		5,02%	3,1%	7,7%
Image of the Region		4,07%	2,5%	5,3%
Accessibility / Infrastructure		15,7%	15,6%	18,2%
Table 5: Comparison of <i>University Stayers</i> , <i>Non Migrants</i> and all survey participants Data Base: Survey of graduates 2012, N = 1769/ last question: Data Base survey of alumni network 2011, N = 475				

The analysis of the survey question “If you had a free choice, which place of residence would you have chosen at the time of your graduation?”²⁵ highlights further differences among *University Stayers* and *Non Migrants*. It becomes apparent that *Non Migrants* are much more willing to stay at the Central Lower Rhine than *University Stayers*, who still show an above-average willingness to start professional life in the region at the time of graduation. Furthermore, *Non Migrants* evaluate the soft location factors (recreation, image, infrastructure) noticeably better than *University Stayers*. Additionally, personal and family related reasons influence the *Non Migrants’* decision more often.

²⁵ Data Base survey of alumni network 2011, N = 475

2.4 Determinants of Migration in econometric analysis

After analyzing the regional facts and descriptive data results carefully, it is necessary to broaden the empirical approach to receive information about whether the results of the analysis can be generalized. For the following variables, the descriptive analysis indicated a connection with the graduates' migration decisions could be detected in the empirical analysis presented above:

- Origin (region, certificate of secondary education was received in)
- Field of study
- Temporary stay abroad
- Duration of job seeking
- Characteristics of job contract (Starting salary / fixed-term or permanent / full-time or part-time)
- Migration motives (job-related reasons, personal and family-related reasons)

Several additional relationships were identified in similar studies, but cannot be supported by the analysis of the given data set. Nevertheless, to offer a comprehensive analysis, these variables will be included as control variables in the estimation approach.

In the following, it will be assessed whether the identified connections can be considered to lead to a clear linear relationship between the variable and the individual's choice of migration after graduation. This question will be addressed with the help of a simple probit regression. Using the data from the alumni network survey, the following reduced-form equation is estimated:

$$\begin{aligned} Migration = & \beta_0 + \beta_1 RegOrigin_i + \beta_2 UniversityEntrance_i + \beta_3 Apprenticeship_i + \beta_4 Gender_i \\ & + \beta_5 TempStayAbroad_i + \beta_6 JobSeeking_i + \beta_7 industry_i + \beta_8 retail_i + \beta_9 SME_i \\ & + \beta_{10} SelfEmployed_i + \beta_{11} PersonalReasons_i + \beta_{12} JobReasons_i + \beta_{13} Textile_i \\ & + \beta_{14} Economics_i + \mu \end{aligned}$$

Where $i \equiv$ the graduates surveyed, and where the dependable variable *Migration* is a dichotomous variable that is assigned the value of 1, if the graduate starts the first job in the Central Lower Rhine Area and a value of 0, if the graduate migrates to any other Region. For the following determinants, for which a connection with the dependable variable could be identified in empirical analysis, an independent variable was included in the estimation:

- Origin: *RegOrigin* symbolizes the region, where the university entrance diploma was achieved (1 = Central Lower Rhine Area).
- Field of study: corresponding variables are *Textile* and *Economics*, where the variable is assigned the value of 1, if the graduate studied in the corresponding faculty.
- Temporary stay abroad: The corresponding variable *TempStayAbroad* is assigned a value of 1, if the graduated experienced a temporal stay longer than four months abroad during the studies.
- Duration of job seeking: The variable *JobSeeking* indicates how many months the graduate was searching for a job after graduation.
- Migration Motives: *PersonalReasons* (1 = personal and family related reason identified as migration motive), *JobReasons* (1 = job related reason identified as migration motive)
- The variables *Starting Salary* and *Characteristics of Job Contract* were excluded due to relatively small sample sizes in some categories. Especially concerning the question about *Starting Salary*, the response rate was low, leading to small sample sizes particularly for the higher salary classes.

Several additional relationships were identified in similar studies, but cannot be supported by the analysis of the given data set. Nevertheless, to offer a comprehensive analysis, these variables will be

included as control variables in the estimation approach. Therefore, dummy variables are assigned to the variables *UniversityEntrance*, which describes the form of university entrance diploma (1 = *Abitur*), *Gender* (1 = female), *industry* (1 = the graduate works in industrial production), *retail* (1 = the graduate works in the retail market), *SME* (1 = the graduate works in a small or medium sized enterprise), and *SelfEmployed* (1 = graduate is self-employed). Graduates working in large companies demonstrate a high propensity to start professional life in urban employment regions with high population density. Accordingly, as the Central Lower Rhine Area is rather peripheral and surrounded by the Rhein-Ruhr-Metropolises, graduates working in large companies instead of small and medium sized enterprises (SME) might have a higher propensity to leave the area. Furthermore, as the idea that spin-offs and business start-ups of students are often located in close proximity to their universities is very prominent in academic literature,²⁶ the variable *SelfEmployed* was included as well.

Summarized, the analysis included individual-related variables, study-related variables, and variables related to the working life. The results of the regression analysis based on a binomial model with random effects are presented in table 6.

Graduate starting professional life in the Central Lower Rhine Area			
	Coeff.	Std. Err.	P> z
Regional origin***	0,79	0,19	0,000
University Entrance diploma	0,33	0,58	0,574
Apprenticeship	-0,02	0,18	0,906
Gender: Female	-0,19	0,20	0,453
Temporary Stay Abroad	0,29	0,28	0,242
Job-Seeking	-0,05	0,03	0,102
Industry	-0,20	0,21	0,327
Retail Market	0,54	0,33	0,106
SME	-0,04	0,20	0,830
Self-Employed	0,00	0,30	0,998
Personal & Family-Related Reasons***	1,39	0,19	0,000
Job-Related Reasons***	0,73	0,20	0,000
Faculty Textile & Clothing Management	0,20	0,27	0,466
Faculty Business Administration & Economics	0,07	0,20	0,710
cons	-2,32	0,33	0,000
Participants: 369, alumni network survey		Prob> chi2 =0,000	
LR chi2 (14)= 93,76		Pseudo R2= 0,2637	

Table 6: Regression results for a binomial model with random effects. Dependent variable: Graduate starting professional life in the Central Lower Rhine Area

The research aim is to obtain knowledge about general migration determinants, where a linear relationship can be identified between the dependent variable and the independent variable. The analysis evidences that only three of the variables can be identified as significant determinants (***denote significance at the 0.01 level), linearly influencing the graduates' decision, where to start the first job: the variable *Regional Origin*, *Personal and Family-Related Reasons*, and *Job-Related Reasons*. For all other variables, no significant linear influence on the graduates' migration decision was detected. This leads to the following general conclusion:

²⁶ Fritsch et al. 2007, p. 28.; Egehn et al. 2003, p. 42.

1. Graduates, who originate from their region of higher education exhibit an above-average propensity to remain in the area surrounding the university.
2. Job-related reasons have a high influence on the migration decision of graduates. Absent or poor job perspectives in the regional surrounding of the university are one of the most important reasons for graduates to migrate to other employment regions. If job-related reasons are mentioned by graduates as important migration motive, the probability for them to migrate rises.
3. Personal and family-related reasons have a high influence on the migration decision of graduates. If personal and family related motives influence the migration decision, graduates show a higher probability to remain in the region.

3 Summary and Conclusions

Human Capital is one of the key factors in understanding and supporting regional economic performance. Especially in times of demographic changes and growing demand for highly-qualified graduates of higher education, it is of high importance to understand, how many and which graduates remain in the region surrounding their university after graduation.²⁷ To deduct strategic implications, moreover the motives that stand behind graduate migration are to be assessed.

This article analyzes graduate migration in the Central Lower Rhine Area, a traditional industrial region in a rather peripheral western part of North-Rhine-Westphalia, Germany. The Central Lower Rhine Area is surrounded by economically more successful metropolitan areas of the Rhine-Ruhr-Area with attractive employment markets. As the region has been facing severe adjustment problems due to structural changes in the last decades, a university-related sustainable gain of highly qualified human capital would be a critical success factor for the region. The article focuses on results of the analysis of a threefold dataset investigating the graduate migration of the only public institute of higher education in the region, the Niederrhine University of Applied Sciences (NR UAS). Although the focused research area might be mostly of regional importance, the article offers interesting insights and implications concerning the phenomenon of graduate migration from peripheral regions with below-average economic performance. Crucial information about graduate migration patterns and motives, graduate characteristics influencing the migration decision, and the comparison of actual migration patterns with migration plans were gained and presented.

To analyse migration patterns, the sample was separated into four migration groups: *Repeat Migrants*, *University Stayers*, *Late Migrants*, and *Non Migrants*. The analysis supports the idea of the NR UAS being a “regionally rooted university”, as the mission statement of the celebration for its 40th anniversary claimed – the catchment area for first semester students is exceptionally regionally oriented. Furthermore, the migration patterns indicate a university related overall brain drain. The loss of human capital resulting from regionally originated graduates emigrating to other employment markets (*Late Migrants*) cannot be compensated by extra-regional brain gain stemming from other regions and remaining in the region (*University Stayers*). In simple words: there are more graduates who originally come from the Central Lower Rhine than remaining there after graduation, and overall there are more graduates leaving the region than staying. This might be a problem for regional companies, as in the competition for highly-qualified young professionals from external education markets, they have to compete against the surrounding economical more prosperous metropolises.

²⁷ Falk / Kratz 2009, p. 65

Comparing the plans of students in their final semester with actual graduate migration patterns, it becomes apparent that the figures resemble each other. In fact, the analysis of how graduates found their first job shows that 39% made the connection that lead to their first employment during the time of studies or due to activities of the NR UAS. This underlines that for a large proportion of young professionals, the question of where they start their professional life has already been decided before the end of their studies and before their first applications. Companies that demur about a shortage of skilled labour are hence well-advised to get in contact with universities or students via part time jobs, apprenticeships, the mentoring of a final thesis, or seminar projects.

Moreover, it is of essential importance to understand, which graduates start their working life in the region surrounding their university, and which graduates migrate to other employment areas. Therefore, variables and characteristics influencing graduate migration were analysed. The *form of diploma entrance certificate, graduates' age, study success, apprenticeship, company size and branch, and form of employment* (self-employed, employee, civil servant) could not be identified as determinants in the migration decision process of graduates. For other variables, interesting results were verified:

- The probability to remain in the region after graduation differs considering different *fields of study*. A remarkably positive brainflow-balance was assessed for graduates of *Social Sciences* and *Health Care Management*, whereas graduates of the specialized study fields *Textile and Clothing Management* and *Design* are most prone to migration.
- A *Temporary Stay Abroad* during the studies does not influence the propensity to migrate; but it raises the migration distance range of those graduations who decided to leave the region. International exchange programs can hence be supported by universities without the expectation of a higher external emigration rate of migrants.
- An analysis of the *Duration of Job Seeking* suggests that some graduates broaden their application scope after three months of ineffective search. The proportion of non-migratory graduates lowers noticeably after writing applications for a longer period than three months.
- Furthermore, the data suggest that a very high *starting salary* can act as a pull factor to other regions. The proportion of non-migratory graduates is considerably lower from a starting salary of 3.000€ upwards.²⁸ Nevertheless, this might be due to the fact that real wages in the investigated area are lower than the national average and starting salaries above 3.000€ are seldom offered.
- Considering the *form of job contract*, graduates with working contracts of lower attractiveness (fixed-term contract, part-time job) work in the investigated area more often. Possibly, they might be willing to accept less attractive job conditions, if migration costs can be kept low.

To be able to deduct strategic implications concerning the attraction of highly-qualified human capital to the region, it is essential to understand the motives that drive the migration decision of graduates. The dominant migration motives are job-related and personal/family-related motives. Remarkably, soft location factors as recreation amenities, cost of living, image, and accessibility and infrastructure seem to be a minor motive. However, location factors that rather speak in favour of remaining at the Central Lower Rhine are the cost of living, accessibility and infrastructure, and a possibility to start further study programs. Soft location factors that are for more graduates a reason to leave the region than to stay are the image and lack of recreation facilities and amenities.

In further analysis, the motives to stay in the Central Lower Rhine Area were differentiated according to the identified migration patterns. The data suggest that the *Non Migrants* are more regionally

²⁸ Due to a low response rate and correspondingly small sample sizes in the higher salary groups, this suggestion should be further tested in studies with higher sample sizes.

rooted, their personal ties and local identity seem to be an important motive to reside in the region after the graduation instead of migrating. Hence, they are also more actively searching for jobs in the regional area and know the local economy better. Hence, the conclusion is suggested that, given an adequate job offer, *Non Migrants* ceteris paribus have a high preference to start working in the region. The analysis indicates that for the group of the *University Stayers*, personal and family-related reasons, or the local recreational amenities and regional image are less often an important motive to start a professional life at the investigated area. In fact, *University Stayers* often stay, because they easily and quickly get a job. Hence, external human capital can be attracted to the regional employment market by connecting graduates with possible employers and procuring the graduates with an easy and quick job opportunity. Nevertheless, for regional companies, it might be easier to attract and to keep graduates on a long term basis, if they are regionally originated, as these students show a noticeably higher willingness to stay at the Central Lower Rhine.

The considerations underline the crucial importance of an institute of higher education for rather peripheral regions facing economic and demographic challenges. If they want to receive tertiary education, the regionally originated high potentials have a chance to stay in the region they are bonded to via family, friends, and personal networks. Without an institute of higher education, those high potentials would have to migrate to receive higher education, reducing the probability of them starting their working life in their home area. Regional companies in peripheral regions often face difficulties to attract external human capital, as nearby metropolitan areas act as pull factor. Institutes of higher education offer a possibility not only to keep the regionally originated high-potentials, but also to attract externals to the area with attractive study programs. Facing the research question what motives and characteristics determine the students' migration decision after graduation, econometric analysis indicates three factors that significantly influence the decision: *Regional Origin*, *Personal* and *Family-Related Reasons*, and *Job-Related Reasons*. Students, who originate from the region they finish higher education in, show a high willingness and higher probability to start professional life in the area surrounding the university. Personal and family-related reasons are thereby a vital motive for remaining in the region. Nevertheless, job-related reasons have a high influence on the migration decision of graduates; graduates do not stay without an adequate job offer. Good jobs with attractive contract conditions consequently act as pull factor to other employment regions.

Finally, it has to be underlined that two thirds of the graduates who left the area after graduation would have stayed given a better job offer. The high amount of young professionals who would stay given a better job offer, but do not know possible local employers and the local economy at all, reflects an enormous potential for the regional economy. This underlines the suggestion that a high potential of human capital is available that needs to be further realised. On the one side, companies expressing a shortage of skilled human capital can approach students and the university more actively. On the other side, if the institute of higher education successfully connects students with local employers efficiently, the regionally originated and external high-potentials can be attracted to the local economy on a long-term basis. The role of the university as possible employment broker or recruitment supporter for regional companies should consequently be discussed more actively, as it offers vital opportunities for the regional economy.

Literature

- ACS, ZOLTAN AND ARMINGTON, CATHRINE (2004): "Employment Growth and Entrepreneurial Activity in Cities". In: Discussion Papers on Entrepreneurship, Growth and Public Policy, Nr. 1304 Max-Planck-Institute for Research into Economic Systems and University of Baltimore.
- AUDRETSCH, DAVID B.; BRAUNERHJELM, PONTUS; ACS, ZOLTAN J.; CARLSSON, BO (2010): The missing link: knowledge diffusion and entrepreneurship in endogenous growth. In: Small Business Economics, Nr. 34, Jg. 2010, S. 105-125.
- ANSELIN, LUC; ACS, ZOLTAN; VARGA, ATTILA (2000): „Geographical Spillovers and University Research: a spatial econometric perspective“. In: Growth and Change, Nr. 31 (4), S. 501-515.
- BACK, HANS-JÜRGEN; FÜRST, DIETER (2011): Der Beitrag von Hochschulen zur Entwicklung einer Region als „Wissensregion“. E-Paper Nr. 11, Akademie für Raumforschung und Landesplanung (Hrsg.), Hannover.
- EGELN, JÜRGEN; GOTTSCHALK, SANDRA; RAMMER, CHRISTIAN; SPIEGELKAMP, ALFRED (2002): Spinoff-Gründungen aus der öffentlichen Forschung in Deutschland, Mannheim.
- FABIAN, GREGOR, MINKS, KARL-HEINZ: „Muss I den zum Städtete hinaus? Erwerbsmobilität von Hochschulabsolventen“, HIS Magazin, 3, Hannover, Juli 2008, S. 4-5.
- FALK, SUSANNE / KRATZ, FABIAN (2009): "Regionale Mobilität von Hochschulabsolventen beim Berufseinstieg". In: Bayrisches Staatsinstitut für Hochschulforschung und Hochschulplanung IHF (Hrsg.), Beiträge zur Hochschulforschung, Jahrgang 31, Nr. 3.
- FEDERAL STATISTICS OFFICE *STATISTISCHES BUNDESAMT* (2003-2011): Bildung und Kultur - Monetäre hochschulstatistische Kennzahlen 2007. Fachserie 11, Reihe 4.3. Statistisches Bundesamt, Wiesbaden.
- FLORIDA, RICHARD (2004): The rise of the Creative Class. New York Publishing: Basic Books.
- FRITSCH, MICHAEL; HENNING, TOBIAS; SLAVTCHEV, VIKTOR; STEIGENBERGER, NORBERT (2007): Hochschulen, Innovation, Region – Wissenstransfer im räumlichen Kontext. Hans-Böckler-Stiftung (Editors), Berlin: edition sigma. ISBN : 3836086824
- FROMHOLD-EISEBITH, MARTINA (1992): Wissenschaft und Forschung als regional-wirtschaftliches Potential? Das Beispiel von Rheinisch-Westfälischer Technischer Hochschule und Region Aachen. Maas-Rhein Institut für Angewandte Geographie: Aachen, Germany. ISSN: 0177-8854
- HAMM, RÜDIGER; JÄGER, ANGELIKA; KARL, HELMUT; KOPPER, JOHANNES; STROTEBECK, FALK; WARNECKE, CHRISTIAN (2012): RegTrans – Zwischenbericht I. Regionale Transfereffekte verschiedener Hochschultypen – Analyse und Strategien für eine verbesserte Potenzialausschöpfung. 25th June 2012, on http://www.hs-niederrhein.de/fileadmin/dateien/institute/niers/pdf/REGTRANS_Zwischenbericht_2012.pdf
- HELL, STEFAN; OTTO, ANNE; WYDRA-SOMAGGIO, GABRIELE (2011): Räumliche Mobilität von FH-Absolventen; Empirische Analyse der Mobilität von den Absolventen der Hochschule für Technik und Wirtschaft (HTW), Saarland. IAB Rheinland-Pfalz-Saarland: Saarbrücken, Germany.
- INSTITUT FÜR ARBEIT UND TECHNIK IAT (2012): Newsletter Forschung aktuell, 03/2012. 25th June 2012, on <http://www.iat.eu/forschung-aktuell/2012/fa2012-03.pdf>.
- IHK, INDUSTRIE- UND HANDELSKAMMER DÜSSELDORF UND MITTLERER NIEDERRHEIN (2012): Konjunktur-Sonderthema: Fachkräftemangel in der Region Düsseldorf / Mittlerer Niederrhein – Jahresbeginn 2012. 27th April 2012, on http://krefeld.ihk.de/media/upload/ihk/imap/20120201/fachkraeftemangel_jb2012_imap.pdf
- KREUTZER, FABIAN / JAEGER, ANGELIKA (2011): Wege des Humankapitals: Warum gehen die High-Potentials?“ – Migrationsverhalten und Determinanten am Beispiel der Hochschule Niederrhein. Presentation during the winter seminar 2011 of the *Gesellschaft für Regionalforschung GFR*, the German group of the European Regional Science Association in Matrei, Austria.
- MELLANDER, CHARLOTTA / FLORIDA, RICHARD (2007): The Creative Class or Human Capital? Explaining regional development in Sweden. CESIS Electronic Working Paper Series, Paper No. 79, on <http://www.creativeclass.com/rfcgdb/articles/the%20creative%20class%20or%20human%20capital.pdf>.

- MINKS, KARL-HEINZ / FABIAN, GREGOR (2007): Erwerbsmobilität von Hochschulabsolventen – HIS Absolventenbefragung 2006/07. Presentation in the Leibniz Institute for Economic Research at the University of Munich (Institut für Wirtschaftsforschung IFO), on 12.12.2007. 03rd October 2011, on http://www.his.de/pdf/pub_vt/22/2007-12-12_Vortrag_Minks_Fabian_Dresden.pdf
- MOHR, HENRIETTE (2002): Räumliche Mobilität von Hochschulabsolventen. Beiträge zur Arbeitsmarkt- und Berufsforschung, Vol 256.
- NIEDERRHEIN UNIVERSITY OF APPLIED SCIENCES (2012): Aus der Region gewachsen; Präsidiumsbericht 2011. 27th June 2012, on http://www.hs-niederrhein.de/fileadmin/dateien/Praesidium/HSNR_Praesidiumsbericht_2011.pdf
- ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT OECD (2011): "Education outcomes", in OECD, Government at a Glance 2011. OECD Publishing, Paris. Doi: 10.1787/gov_glance-2011-60-en (ISBN: 978-92-64-11420-3).
- REDDY, PRASADA (2011): The Evolving Role of Universities in Economic Development: The Case of University-Industry Linkages. In Göransson, Bo; Brundenius, Claes (Ed.) (2011): Universities in Transition – The Changing Role and Challenges for Academic Institutions. PP 25-52. Springer Science and Business Media: New York, Dordrecht, Heidelberg, London.
- RODRIGUEZ-POSE, ANDRÉS; VILALTA-BUFÍ, MONSERRAT (2004): Education, migration, and job satisfaction: The regional returns of human capital in the EU. In: Bruges European Economic Research Papers, Nr. 1, 2004.
- ROSENFELD, MARTIN; FRANZ, PETER; ROTH, DIANA (2005): Was bringt die Wissenschaft für die Wirtschaft in der Region? Regionale Innovations-, Wachstums- und Einkommenseffekte von öffentlichen Hochschulen und Forschungseinrichtungen am Beispiel der Region Halle. Nomos: Glashütte, Germany. ISBN: 3832910999
- SCHMOCH, ULRICH (2011): Germany: The Role of Universities in the Learning Economy. In Göransson, Bo; Brundenius, Claes (Ed.) (2011): Universities in Transition – The Changing Role and Challenges for Academic Institutions. PP. 261-282. Springer Science and Business Media: New York, Dordrecht, Heidelberg, London.
- SIEGEL, DONALD; WRIGHT, MIKE; AND LOCKETT, ANDY (2007): „The rise of entrepreneurial activity at universities: organizational and societal implications“. In: Journal of Industrial and Corporate Change. Volume 16, Issue 4; pp. 489-504.
- SPEHL, HARALD; SAUERBORN, KLAUS; SAUER, MARTIN; BENSON, LUTZ; FESER, HANS-DIETER; MALOTTKI, CHRISTIAN; SCHMITT, REBECCA; SCHULZE, PETER; FLOHR, MARTIN (2006): Regionalwirtschaftliche Wirkungen der Hochschulen und Forschungseinrichtungen in Rheinland-Pfalz, Langfassung. Trier, Kaiserslautern, Mainz.
- VARGA, ATTILA (1998): University Research and Regional Innovation: a Spatial Econometric Analysis of Academic Technology Transfers. Kluwer Academic Publishers: Massachusetts, USA.