



The Network of International Student Mobility (Working Title)

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INTRODUCTION

In Western democracies, public universities are often regarded as role models for the democratic organisation of the overall society. In the context of international student mobility, it is often theorized that students from democratically less developed countries might cater to the diffusion of democratic norms in their home country upon return after a study related stay in a democratically more advanced country. Up to date, there is not yet a debate if international student mobility can have such an impact. In this ongoing project, our particular focus is on countries' levels of democracy according to the Democracy Index of the Intelligence Unit of The Economist (2010). Our research aims at investigating the flow of internationally mobile students from a network perspective. We expect that the higher levels of democratization are, the more attractive countries become as destinations for internationally mobile students. Due to the positive correlation between economic development and democratization, which we find in our data, we focus on the mediating effect of GDP per capita.

DRIVING FORCES OF TRANSNATIONAL NETWORK FORMATION: PREVIOUS RESULTS

In a previous article (see Vögtle and Windzio 2016) we investigated the impact of membership in the Bologna Process on patterns and driving forces of cross-national student mobility. Student exchange flows were analysed for almost all Bologna Process member states and non-Bologna OECD members over a ten-year period (from 2000 to 2009). We applied a *Social Network Approach* focusing on outbound diploma-mobility to identify positions of countries in the network of cross-national student exchange. We visualized the exchange patterns between sampled countries and analysed the student exchange linkages to gain descriptive insights into the development of the network. This revealed that cross-national student exchange network is stable over time with the United States, Great Britain, France, and Germany at its core; they attract the highest shares of students from the remaining countries in our sample.

Analytically, we refer to the *principle of homophily*, derived from social network theory (McPherson et al. 2001), as well as assumptions about the *complementarity* of exchange relationships. This already implies that they can be imbalanced and characterized by *dependence structures and power asymmetries* (see Pfeffer and Salancik 1978). We refer to theories of *hegemony*, which regard the dominance or supremacy of an institution, state,

organization or similar actor as a driving factor for alliances (see Shields 2013:615). According to the results of previous studies on international student mobility (Barnett and Wu 1995, Chen and Barnett 2000, Vögtle and Windzio 2016), an *academic hegemony* (Barnett and Wu 1995) consistent with world economic and political performance can be assumed.

Through previous research we have identified that a) common membership in the Bologna-Process leads to a higher share of international exchange students, that b) the most relevant but also most imbalanced (see Vögtle and Fulge 2013; Fulge and Vögtle 2014) exchange relationships exists between bordering countries, that c) English speaking countries attract the highest share of international students and that d) countries with a high GDP per capita have greater chances to host students than less prosperous countries. We now wish to widen our focus by including variables accounting for the degree and similarity in democratization level between the sampled countries. We wish to investigate the democratization aspects in more detail, underpin it theoretically better and include a broader data base for the assessment of a countries' level of democracy.

DATA, SAMPLE AND METHODS

The data on internationally mobile students reflects absolute numbers of dyadically exchanged students in the respective years and can be conceptualized in the form of a series of directed links. We analyze the number of exchanged students divided by the total number of students enrolled in tertiary education (International Standard Classification of Education [ISCED 1997] level 5A and 6) in the sending country which accounts for the size of the tertiary education sector of the countries investigated. Thus, we account for the opportunity of the whole student body of a given country to become internationally mobile.

The dependent variable refers to the number of students EGO (sending country) who migrate to ALTER (receiving country), divided by the number of all students enrolled in EGO. After computing the quartiles over all country-pairs, the dependent variable has been dichotomized by setting the highest quartile to one and the three lower quartiles to zero for the analysis of binary networks (see models 1-3 in Table 2). By imposing this restriction to the definition of a network tie in the respective dimension, we ensure that only a relevant share of ego's students who migrate to the alter country constitute a tie between the two countries. As has been outlined above, *homophily* assumptions are central to our investigation. We thus analyze whether, on the one hand, (a) structural similarity in higher education policies between countries (e.g. the common use of ECTS), (b) general socio-economic similarities or (c) cultural similarities influence the probability for exchange ties between the countries under investigation. Previous studies on cross-national student mobility found out that the flow of international students is closely tied to economic development (see Barnett and Wu 1995, Chen and Barnett 2000), thus, we use general socio-economic similarities—in our case measured as the (negative) absolute distance between the GDP per-capita of two countries—to account for national capabilities. According to a recent study on international student mobility, a common language between two countries is among the most important predictors for the structure of the flow of exchanged students (see Barnett et al. 2015), we thus account for cultural similarity by coding whether two countries' official language(s) belong to the same language family or language branch (see Lewis et.al. 2015). Additionally, since the existence of a common border between two countries and geographic proximity between them have been identified as important predictors for student exchange patterns between them (see Barnett et al. 2015), we include information as to whether two countries of a dyad share a common land or sea border. Secondly, we use exponential random graph models (ERGMs) that were developed in order to explain why we observe a specific empirical realization of a

network among a given set of units (vertices). Here, the focus is on the structural characteristics of the network, on the attributes of countries as well as on their similarity or difference with regard to salient characteristics, which determine whether there is a tie between them or not. We estimate ERGMs (Lusher et al. 2013) for binary networks, where the dependent variable is 1 if there is a relevant tie in a dyad, and 0 otherwise.

DETERMINANTS OF TIES: RESULTS OF ERGM

Table 1 shows a series of exponential random graph models of ties in the network of global student mobility for the years 2000, 2004, and 2009. For each year we estimated three models: the first model includes the effects of levels of democratisation for in-degree and out-degree as well as the effect of the absolute difference in democratisation. In addition, network structural effects have been controlled, namely GWESP (geometrically weighted edgewise shared partners), mutuality and cyclic triplets. There is also a dyadic edge-covariate indicating whether two countries share a border or not. The second model controls also for the effect of languages, namely of English on in-degree, the same language branch, as well as a mix of languages in the focal country on in- and out-degree. In addition, the second model controls for ECTS and membership in the Bologna process. In the third model specification, finally, we also control for GDP per capita on in-degree, out-degree, and the effect of the absolute difference in GDP on a ties in the respective dyad.

In models 1 and 2 we find a negative effect of the absolute difference in democratisation. In other words, the more dissimilar two countries are with respect to democratization, the lower is the propensity to form a tie in the network of student mobility. Possibly, student mobility is concentrated at the two ends of the continuum of democratisation: there could be a high density within comparatively authoritarian regimes on the one hand, but also within comparatively democratic regimes. We will readdress this issue below. In addition, in models 1 and 2 we find highly significant and positive effects of democratisation on in-degree in 2000. In the subsequent years the effect seems to decline and loses in statistical significance, albeit it is still significant at the 5% level in 2009.

The most striking result is the change in the effect of democratisation on in-degree in models 3, 6 and 9, after controlling for GDP per capita. With regard to the GDP effects, we observe an increase in GDP per capita in 2000, in-degree as well as the out-degree in the network increases. The absolute difference in GDP is significant and positive only in the year 2009 (model 9). In other words, countries with high GDP per capita sent considerable proportions of their student population to many other countries only in 2000, but have received students from many other countries in all years. Wealthy countries seem to be highly attractive for students from many other countries. However, in combination with the positive effect of in-degree and the insignificant effect of out-degree, the positive effect of the absolute difference in GDP per capita in 2009, we find indeed that many less wealthy countries send students to comparatively wealthy countries.



Table 1. Ties in the network of international student mobility 2000-2009, ERGMs

	2000				network tie 2004			2009	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
edges	-6.577***	-6.231***	-1.757*	-4.627***	-5.261***	-1.536*	-4.145***	-5.368***	-1.858*
mutuality	-0.030	-0.229	-0.298	0.696**	-0.021	-0.021	0.340	-0.466	-0.514
GWESP (alpha=0.693)	1.541***	1.487***	1.126***	1.639***	1.513***	1.242***	1.713***	1.652***	1.347***
cyclic triplets	-0.551***	-0.480***	-0.491***	-0.654***	-0.488***	-0.464***	-0.759***	-0.637***	-0.565***
<i>economic performance</i>									
absolute difference(GDP per capita)	-	-	-0.013	-	-	0.005	-	-	0.036***
GDP per capita: indegree	-	-	0.133***	-	-	0.123***	-	-	0.093***
GDP per capita: outdegree	-	-	0.050***	-	-	0.024	-	-	0.019
<i>democratization</i>									
authoritarian regime: indegree	0.292***	0.213***	-0.424***	0.143**	0.140**	-0.538***	0.080*	0.111*	-0.489***
authoritarian regime: outdegree	0.087	0.043	-0.156	-0.010	-0.018	-0.120	-0.030	0.013	-0.190*
absolute difference (democracy index)	-0.233***	-0.188**	-0.343***	-0.308***	-0.243***	-0.441***	-0.243***	-0.188***	-0.556***
<i>hegemonic language</i>									
english language: indegree	-	0.693***	0.307*	-	1.114***	0.698***	-	0.961***	0.911***
same language branch	-	0.599***	0.636***	-	0.484**	0.565***	-	0.322*	0.532**
mixed language: indegree	-	0.335	-0.254	-	-0.025	-0.606**	-	-0.226	-0.881***
mixed language: outdegree	-	0.259	0.062	-	0.294	0.190	-	0.086	-0.031
<i>geographic proximity</i>									
shared border	2.283***	2.066***	2.231***	-	2.071***	2.202***	-	2.061***	2.091***
<i>Bologna process</i>									
both apply ECTS or comparable system	-	0.110	0.087	-	-0.026	-0.262	-	-0.192	-0.070
both countries are Bologna participants	-	0.532***	0.534***	-	0.534***	0.739***	-	0.689***	0.834***
Akaike Information Criteria	1,410.055	1,360.051	1,238.573	1,488.969	1,320.952	1,203.299	1,451.708	1,310.553	1,190.470
Bayesian Information Criteria	1,453.274	1,435.685	1,330.415	1,526.786	1,396.587	1,295.141	1,489.525	1,386.187	1,282.312

Note:

*p<0.05; **p<0.01; ***p<0.001



Interestingly, there is an inter-correlation of GDP per capita and democratisation, which reverses the effect of democratisation on in-degree: in all three years the effects of democratisation remain robust after controlling for the effects of language, ECTS and membership in the Bologna process in the first two models for each year. Not until the effects of GDP per capita are controlled in each third model, the effect of democratisation on in-degree reverses its sign. In other words, conditional on levels of economic development, high levels of democratisation show a negative effect on in-degree. Highly democratic countries are unattractive as destinations of student mobility if they're not at the same time economically highly developed.

In addition to the edge effect that is the intercept of the ERGM regression, we determine four characteristics related to the embeddedness of a country pair or dyad in the social network. First, in the binary models we have no significant and weak effects of mutuality, indicating that if one country sends a high share of students to another country, it is not reciprocated to a similar extent. Effects of the GWESP (geometrically weighted edgewise shared partners) are strong and significant: the positive effect of GWESP indicates high degrees of transitivity. Taken together, there is a strong tendency to triadic closure. The presence of each triangle involved increases the likelihood of attaching further triangles with a decreasing function of the number of triangles (Lusher et al. 2013:71). Moreover, the effect of cyclic triangles tends to be negative. Cyclic triangles indicate a non-hierarchical circuit exchange, which is not common between countries, according to the result. Rather, ties between countries due to mobility patterns tend to be hierarchical (see Lusher et al. 2013:44).

SUMMARY AND FURTHER RESEARCH

With regard to homophily assumptions, we can state that an important factor positively influencing student exchange patterns over all models estimated is geographical propinquity (see Shields 2013), which is in line with macro-level theories of migration. Another important homophily factor is the common usage of languages of the same language branch. Unlike common Bologna membership, common application of the ECTS or a comparable system does not increase the likelihood of an exchange tie between two countries. Cultural hegemony, singling out English-speaking countries, is influential. There exists an inter-correlation of GDP per capita and democratisation, highly democratic countries are unattractive as destinations of student mobility if they're not at the same time economically highly developed. In addition, we see that the basic pattern of hierarchical triadic relationships holds for the countries' student mobility networks. Hence, the networks of international student mobility investigated resemble patterns commonly observed in friendship networks.

In further research, we wish to include non-OECD countries with high outbound-mobility rates into our sample (e.g. China, India, and Pakistan). We seek to test if our results are still valid if the investigation moves beyond OECD countries and if different mechanisms determine the flow of international student mobility if our sample is extended to include these large international student export nations. Moreover, this will allow us to compare different networks, the network of mere OECD countries with the network when large Asian countries are included in the sample. Moreover, we will investigate if religious aspects impact on international student mobility flows, thus we wish to extend cultural similarity variables already investigated (see Vögtle and Windzio 2016) by variables covering religious

similarities between countries. This might be even more interesting when we further extend our sample in order to include countries with predominantly Muslim population. Moreover, we wish to incorporate analyses based on valued relations to model structural network effects.

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