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## The effect of academic socializing strategies on collaboration: Empirical evidence from European economics departments

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**IAAEG**

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**The effect of academic socializing  
strategies on collaboration:  
Empirical evidence from European  
economics departments**

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## **ABSTRACT**

We present an explorative analysis from qualitative and quantitative data of fourteen European economics departments for the years 2001 to 2003 and investigate how one component of a successful PhD education, which is socializing PhD students into the academic community, should be designed in order to support intercultural collaboration among PhD students.

We employ Multi-Value Qualitative Comparative Analysis (MVQCA) to analyze the data. Our results reveal unique patterns of socializing strategies present in economics departments with either high or low intercultural collaboration among PhD students. It turns out that high intercultural collaboration is characterized by two configurations of different socializing strategies. In the first configuration we find that a “high number of foreign PhD students” in a department sufficiently explains high intercultural collaboration as it is realized in American research universities. In the second configuration we find that a combination of “different backgrounds in academic disciplines” among PhD students with “active support for research visits” sufficiently explains high intercultural collaboration. Low intercultural collaboration is characterized by three single strategies: “Financing attendance at academic conferences or events about once per year”, “no active support for research visits” and a “small number of foreign PhD students”. Each condition is sufficient to explain the outcome.

The results for high intercultural collaboration are not affected by any of five resource conditions we added as controls. Low intercultural collaboration though was partly co-explained by low amounts of extra time among faculty and low financial resources of the department. The results indicate that high intercultural collaboration is not only supported by a socializing strategy typical for American research universities but can also be achieved by different socializing strategies.

# 1 INTRODUCTION

In the early 90s, almost all European countries viewed their doctoral programs as falling short of the primordial objective of doctoral education: to qualify young academics to do original research on their own. Given that diagnosis, in many countries initiatives were taken to remedy this dismal situation and to improve the educational environment of future researchers.

In Germany, the situation is not trivial as the “German Science and Humanities Council” (Wissenschaftsrat, 2006) suggested prohibiting non-performing departments from awarding doctoral degrees in the future, thus losing the traditional criterion of university status. Therefore many actors in German higher education institutions turned to the role model of PhD education: structured PhD programs of American research universities. Their doctoral education is characterized by highly selective admission criteria, graduate course work or competitive scholarships. To socialize PhD students into the scientific community they also recruit top students and top faculty world-wide and have them work at one place to create a stimulating and productive research environment. Hence doctoral students with ample national and cultural backgrounds meet at one place and find opportunities to collaborate with each other or faculty members.

Socializing PhD students into the scientific community is not just a value in itself. When PhD students decide to pursue an academic career it is in their interest to find partners who they can collaborate with. Despite some criticism (Thursby, 2000) publications in English and American journals are still the key information for research quality in economics (Combes & Linnemer, 2003; Lubrano, Bauwens, Kirman & Protopopescu, 2003). It is therefore highly beneficial for PhD students, and particular those without an English mother tongue to decide early in their career for a department with a socializing strategy that supports intercultural collaboration with English speaking researchers.

While American research universities offer departments with high numbers of faculty and supervisors with an English mother tongue, most European and particularly German departments are too small to deliver such a community. Instead they have to propose alternative strategies to introduce their PhD students to English speaking departments when they aim to enhance competitive research among their PhD students.

## **2 STRATEGIES TO INTRODUCE PHD STUDENTS INTO THE SCIENTIFIC COMMUNITY**

There are many strategies for supervisors and departments to socialize PhD students into the scientific community and to support them in meeting relevant people for their research or publication ambitions. At least in Germany some strategies are reflected by the funding policy of the German Research Foundation (e. g. DFGa).

One strategy focuses on individual financial support for PhD students by departments or supervisors to participate in scientific events such as conferences, lecture trips or research visits. If departments cannot afford these trips, researchers can apply for financial support at the DFG who for example supports German as well as foreign researchers with individual travel grants to attend these scientific events (e. g. DFGb).

In another strategy, departments establish coordinated PhD programs to educate PhDs students according to a curriculum or course work. The DFG may provide extensive funding for coordinated programs through “Collaborative Research Centres/Transregio” or “International Research Training Groups” (e. g. DFGc).

In a third strategy, researchers and departments establish scientific networks with (inter)national partner institutions with similar background. In the “European doctoral program” for example, economics departments of six European universities and one exchange partner offer a platform of intercultural collaboration among PhD students (EDP). The DFG supports similar efforts through its “Research units” (DFGd) where individual researchers or research

groups work on a research topic in different locations and meet occasionally to exchange ideas and results or to coordinate new projects.

We claim that these strategies represent two main features to support collaboration among PhD students.

The first mode of strategies is characterized by short term support for PhD students to socialize them into the scientific community. For a short time, varying from a couple of days to a couple of weeks, PhD students attend academic conferences or visit departments to collaborate with scientists and to conduct or plan research projects.

The second mode of strategies is characterized by the creation of a long term and persistent research environment. PhD students of ample international as well as academic background can interact with each other at one location to exchange ideas without the urgent need to travel to meet people relevant for research. This mode comes close to the PhD education of American research universities. Another mode of long term strategies offers opportunities to collaborate over long time periods but not continuously. By establishing a research network, for example, research partners in the network are stable but are not necessarily located in the same area and mutual interaction happens only occasionally (research units of the DFG have resources for biannual meetings, for example).

These strategies are not mutually exclusive but can complement each other.

While American research universities are considered to be the role model for PhD education, a variety of successful economics departments in Germany, for example, deliver excellent PhD education (Mayer, 2001; Schlinghoff, 2002; Welsch & Ehrenheim, 1999) without adhering to the American model of PhD education (Sadlak, 2004). Faced with low numbers of faculty and severe cost constraints in the public sector, departments that are serious in their attempts to offer excellent PhD education have to come up with alternative strategies to socialize PhD students successfully into the scientific community.

How far socializing strategies support successful PhD education in general and collaboration opportunities in particular, seems surprisingly unexplored -

anecdotal evidence and personal educational styles rather than scientific facts seem to dominate the discussion. In this study we attempt to partially close this gap.

We limit our study to the field of economics. Economics is internationally comparable and very much focused on international research and English publications, which makes this field prone to considerations of how to design socializing strategies to enhance intercultural collaboration. We regard joint publications of PhD graduates with partners from English speaking research institutions as output criteria. They serve as a close proxy of how well the socializing strategy in an organization can facilitate opportunities for intercultural collaboration.

To shed light on favorable strategies, in the present study we claim that the role model of American research universities is only one of several ways to successfully socialize PhD students into the scientific community. Instead of a single path to successful intercultural collaboration, we find that there are alternative paths or even configurations of different strategies that can succeed. Our research asks this particular question:

Which configurations of socializing strategies lead to high intercultural collaboration?

### **3 METHOD**

#### **3.1 Sample**

Our data is based on a controlled sample consisting out of 14 economics departments from Germany, Switzerland, Italy, Great Britain, France and The Netherlands (indicated as D1 to D14) which were selected to cover a great variation in PhD education styles. To account for different strategies to introduce PhD students into the scientific community, we selected departments according to the PhD education model. We distinguish four models: whether students were trained in a master-apprenticeship setting, in a graduate school, in a graduate center or whether it is a mix of production forms. We assume that educational



models reflect differences in socializing strategies of PhD students to a great degree.

We conducted semi structured interviews with 43 academic and administrative key persons between May 2005 and March 2007 and asked them about the organizational preconditions of the institution under consideration in the years 2001-2002 with special focus of their relevance for PhD education.

### **3.2 Data collection and analysis**

In order to analyze qualitative and quantitative data for small-N cases we use Multi-Value Qualitative Comparative Analysis (MVQCA) (Berg-Schlosser & Cronqvist, 2005; Brayton & Khatri, 1999), which is an enhancement of the Qualitative Comparative Analysis (QCA) (Ragin, 1987). QCA and MVQCA allow statements about qualitative coherence in small samples, based on the principles of Boole's algebra. Both analyses can be conducted through the free software TOSMANA (Cronqvist, 2009). It assumes that the outcome (joint publications) of similar cases (departments) are caused by characteristics of the input conditions (socializing strategies). A "truth table" is constructed to order the characteristics of the conditions and the output for all cases that serve as basis for the MVQCA calculation. The MVQCA delivers grouped cases with same conditional configurations in relation to the same outcomes. While QCA only allows calculations for dichotomized "yes" and "no" conditions, MVQCA extends the procedure to multiple but still nominal conditions and thus allows more complexity.

In MVQCA conditions can be qualitative or quantitative but the latter are then recoded to a nominal scale. Quantitative values can either be transformed into qualitative values by theoretical assumptions or according to mathematical standards through clusters and thresholds provided by the software. The analysis then delivers a minimal set of characteristics for the conditions in relation to the outcome according to a minimization rule of QCA: "If two Boolean expressions differ in only one causal condition yet produce the same outcome, then the causal

condition that distinguishes the two expressions can be considered irrelevant and can be removed to create a simpler, combined expression.” (Ragin, 1987).

Due to more characteristics in the conditions, MVQCA has to extend the minimization rule: “If all  $n$  multi-value expression ( $c_0\Phi, \dots, c_{n-1}\Phi$ ) differ in the causal condition  $C$  while all  $n$  possible values of  $C$  produce the same outcome, then the causal condition  $C$  that distinguishes these  $n$  expressions can be considered irrelevant and can be removed to create a simpler, combined expression  $\Phi$ .” (Cronqvist, 2003).

The results then present groups of cases with the same configuration of conditions according to the outcome but they can also find configurations of conditions for cases with contradictory outcomes. Finally, as a result, MVQCA delivers one or more configuration(s) of the conditions in relation to the outcome.

### **3.3 Analysis**

#### **3.3.1 Outcome conditions**

Success of PhD education has been assessed with various indicators. Some studies consider the total number of graduates (Leszczensky & Orr, 2004), the reputation of a graduate school (Burris, 2004; Ehrenberg, 2004) or placement success (Schneider & Sadowski, in press). The present analysis follows the approach of several studies that consider publication records as performance measure, either for PhD graduates (Hilmer & Hilmer, 2007) or professors (Rauber & Ursprung, 2008). We expand this line of research and draw on joint publications of PhD graduates with co-authors from English speaking institutions (in our study this was USA, GB and Australia) as outcome criteria for intercultural collaboration.

To create this unique dataset we obtained the names of all PhD graduates in our sample departments for the years 2002 to 2006 and followed each individual career path. We consider only PhD graduates who have pursued an academic career either in a university or a university related research institute. We

collected the number of PhD graduates who have published with co-authors from English speaking institutions and relate them to the total number of PhD graduates who have published at all in one year. We then averaged these numbers for the five years. In contrast to some studies which control for the quality of journals (Kalaitzidakis, Mamuneas, & Stengos, 1999; Laband & Piette, 1995) and co-authorships (Coupé, 2003; Lubrano, Bauwens, Kirman & Protopopescu, 2003) our control measure for quality was the appearance of at least one publication of a PhD graduate with a co-author from an English speaking research institution in the list of journals in the “Web of Science”. Due to different publication habits in the field of economics we did not control for the number of co-authors or the number of publications.

In our sample the ratio of co-authorships varies from 0% over five years (0% of PhD graduates publish with co-authors from an English speaking institution) to 0.41 (41% of all PhD graduates publish with co-authors from an English speaking institution). To our knowledge so far, no valid data exists about publication output with co-authors from English speaking institutions. We therefore rely on the mathematical solution delivered by the software TOSMANA and divide the sample into departments of high intercultural collaboration and low intercultural collaboration. The threshold is set at 0.13 (13%), which is the mean and median of the ratio of PhD students publishing with co-authors from English speaking institution. The condition is coded with the values:

0 = co-authorship ratio is  $< 0.13$  (low collaboration);

1 = co-authorship ratio is  $\geq 0.13$  (high collaboration).

### **3.3.2 *Input conditions***

To analyze the strategies to socialize PhD students into the scientific community, we construct five different conditions to reflect the strategies as they have been indicated to us throughout the interviews. We distinguish three long term strategies and two short term strategies.

The first condition of the long term strategies reflects the strategy of departments to accept PhD students with “different backgrounds in academic disciplines” (condition IC1 in table 1) for PhD education. Many of our interview partners indicated that different backgrounds enrich the academic perspectives of PhD students by drawing attention to different viewpoints. But we also found departments that do not favor scientific heterogeneity and focus strictly on one discipline among their PhD students. The condition is coded:

0 = only economics students are accepted as PhD students;

1 = PhD students from related disciplines are also accepted.

Different strategies exist for the “number of foreign PhD students” (condition IC2 in table 1) in a department. We understand this strategy as second long term strategy. While some departments only recruit PhD students from their local home department, departments may also recruit internationally and employ recruitment assistants abroad in order to provide for a great share of PhD students with different national backgrounds. We drew on the statements of our interview partners about how many foreign PhD students study at the department and validated them through the information we received either through the deans offices directly or the web-pages of the departments. The sample spans from 4% to 100% foreign PhD students in a department (the median value is 17%). Based on cluster analysis provided by the software TOSMANA, we constructed three different ranges for the number of foreign PhD students. Accordingly we assigned three different values to this condition:

0 = less than 14% foreign PhD students;

1 = between 14% and 35% foreign PhD students;

2 = more than 35% foreign PhD students.

The third condition of long term strategies is derived from our interviews. Some interview partners indicated that their departments have academic networks with “partner departments” (condition IC3 in table 1) to conduct joint events or to initiate visits on a long term and regular basis. Their supervisors are confident

about the academic quality of the faculty in the partner departments. They only meet several times per year through occasional visits or meetings but continuously for a long period of time. According to the statements of our interview partners, the condition is split into three values to reflect the different strategies:

- 0 = partner departments do not exist;
- 1 = partner departments exist nationally;
- 2 = partner departments exist internationally.

“Financing attendance at academic conferences or events” (condition IC4 in table 1) as our first short term strategy is a very popular procedure to introduce PhD students to new scientific environments. According to our interview partners, the attitude of how many attendances should be financed, varies among the departments. According to the statements of our interview partners the condition is split into three strategies with the values:

- 0 = PhD students receive financial support less than once per year;
- 1 = PhD students receive financial support about once per year;
- 2 = PhD students receive financial support more than once per year.

Most of the departments in our sample actively support “research visits” (condition IC5 in table 1) of their PhD students for a limited time in order to expose them to new cultural and academic perspectives. But according to our interview partners, we also met departments which do not support research visits actively since they often need PhD students at the departments for the daily routine. Therefore we divide the condition according to these two strategies and assign the values:

- 0 = research visits are not actively supported;
- 1 = research visits are actively supported.

The individual characteristics of each condition for each department are summarized in the configuration table of table 1. Row one characterizes the

following organizational configuration: Department D1 (column 1) successfully enhances intercultural collaboration (column 2) by accepting PhD students with different backgrounds of academic disciplines (column 3). Between 14% and 35% foreign PhD students study at the department (column 4), they finance attendance of their PhD students at academic conferences or events more than once per year (column 6), research visits are actively supported (column 7) and they cooperate with international partner departments (column 5). Departments D1, D5 and D9 exhibit the same configuration of conditions.

Table 1: Configuration table. Values of the conditions in relation to the outcome for each department

ID	O	IC1	IC2	IC3	IC4	IC5
D1	1	1	1	2	2	1
D2	0	1	1	1	2	0
D3	0	0	0	0	2	1
D4	0	0	1	2	1	1
D5	1	1	1	2	2	1
D6	0	0	1	0	1	0
D7	0	1	0	0	1	0
D8	0	0	0	0	1	1
D9	1	1	1	2	2	1
D10	1	1	1	0	2	1
D11	1	1	2	2	0	1
D12	1	1	1	1	0	1
D13	1	0	2	2	0	1
D14	0	0	0	2	0	1

Note: O=outcome (1=high collaboration, 0=low collaboration); ID: sample departments (D1-D14); IC1: different backgrounds, IC2: foreign students, IC3: partner departments, IC4: conferences or events, IC5: research visits.

A MVQCA was then conducted with outcome=1 (publication ratio > 0.13), „logical remainders“ are included. The results are demonstrated in table 2.

## 4 RESULTS

### 4.1 Configurations of high intercultural collaboration

The solution of table 2 demonstrates that departments which are successful in enhancing intercultural collaboration exhibit two successful strategies to introduce PhD students into the scientific community.

Configuration 1a demonstrates that a ratio of more than 35% foreign PhD students (IC2 {2}) is a single sufficient condition to explain high intercultural collaboration among PhD students for two departments (D11 and D13). Since departments D1, D5, D9, D10 and D12 also exhibit high collaboration, configuration 1a is sufficient to explain high collaboration for the two departments.

The result of configuration 1b exhibits a second successful combination of two socializing strategies. It demonstrates that the combination of PhD students with different backgrounds in academic disciplines (IC1 {1}) in addition with an active support for research visits (IC5 {1}) enhance high intercultural collaboration. Each of the two conditions is not successful by itself but relies on the joint presence of the additional condition. Because department D13 also exhibits high collaboration without these two joint conditions, configuration 1b is sufficient to explain high collaboration for departments D1, D5, D9, D10, D11 and D12.

Table 2: Configurations for high intercultural collaboration (outcome=1)

<b>solution</b>	<b>Configuration 1a</b>	<b>Configuration 1b</b>
condition	IC2 {2} +	IC1 {1} • IC5{1}
cases	D11, D13	D1, D5, D9, D10, D11, D12

Note: “•” means logical AND “+” means logical OR; IC1{1}: PhD students with different backgrounds in academic disciplines are accepted; IC2{2}: the department has more than 35% foreign PhD students; IC5{1}: research visits are actively supported; D1, D5, D9, D10, D11, D12 and D13: departments with high intercultural collaboration.

The results demonstrate a unique cluster of six departments in configuration 1b and a less solid cluster of two departments in configuration 1a. To assess the relative importance and the meaning of each configuration for explaining successful strategies, we compute coverage scores for each configuration (Ragin, 2006). Coverage scores reflect the relative importance of one configuration in relation to all configurations in one solution with the same outcome. If several configurations of one solution share the same cases, these cases are considered to overlap and are taken into account for the coverage scores. In our study, an overlap occurs for department D11, which is present in both configurations. The coverage scores of configurations 1a and 1b are illustrated in table 3.

Coverage scores yield three information as described in table 3. The first score (raw coverage) demonstrates how many cases with the same outcome are explained by this configuration. In configuration 1a the raw coverage is calculated by dividing the two cases in the configuration (D11 and D13) by the seven cases of the total solution (D1, D5, D9, D10, D11, D12 and D13) which equals 0.29. It indicates that this configuration is present in 29% of departments with PhD graduates with high intercultural collaboration. The second information provides data about the cases that are present in both configurations which in our case is department D11. The overlap is one case out of seven that equals 0.14 or 14%. The third coverage score informs about the unique coverage of the configuration that is calculated by subtracting the fraction of the overlap (0.14) of both configurations (D11) from the raw coverage of each configuration. Hence configuration 1a will lead to a unique coverage of 0.15 (0.29 - 0.14) or stated differently: a unique set of 15% of all cases in configuration 1a are sufficient to explain high intercultural collaboration.

The coverage scores for configuration 1b are calculated respectively and demonstrate a raw coverage of 0.86 (86%), an overlap of 0.14 (14%) and a unique coverage of 0.72 (72%).



The results indicate that the cases of each configuration independently determine success but that configuration 1b accounts for more successful cases than configuration 1a.

Table 3: Raw coverage, overlap and unique coverage scores for configurations 1a and 1b

	<b>configuration</b>	<b>RC</b>	<b>Overlap</b>	<b>UC</b>
<b>1a</b>	IC2{2}	2/7=0.29	1/7=0.14	0.29-0.14=0.15
<b>1b</b>	IC1{1} • IC5{1}	6/7=0.86	1/7=0.14	0.86-0.14=0.72

Note: RC=raw coverage, UC=unique coverage; “•” means logical AND; IC1{1}: PhD students with different backgrounds in academic disciplines are accepted; IC2{2}: the department has more than 35% foreign PhD students; IC5{1}: research visits are actively supported.

Next to the analysis of socializing strategies for high intercultural collaboration MVQCA also offers the possibility to scrutinize for strategies that result in low intercultural collaboration.

#### **4.2 Configurations of low intercultural collaboration**

The analysis of conditions that cause low collaboration (outcome=0) delivers one solution (table 4) with three single sufficient conditions. Financing attendance at academic conferences or events once per year (IC4 {1}) is sufficient to explain low intercultural collaboration for four departments (D4, D6, D7 and D8) as indicated in configuration 2b. The solution also demonstrates that no active support for research visits (IC5 {0}) for departments D2, D6 and D7 (configuration 2b) and less than 14% foreign students at the department (IC2 {0}) as indicated in configuration 2c for departments D3, D7, D8 and D10 each explains low intercultural collaboration.

We calculate the coverage scores of departments with low collaboration in the same way as for departments with high intercultural collaboration. The coverage scores yield a raw coverage score for configuration 2a of 4/7=0.57 (57%). Department D6 overlaps with configuration 2b and departments D7 and D8

overlap with configuration 2c which results in an overlap score of  $3/7=0.43$  (43%). Subtracting the overlap from the raw coverage leads to a unique coverage score of  $0.57-0.43=0.14$  (14%) for configuration 2a. The raw coverage for configuration 2b is  $3/7=0.43$  (43%), the overlap is  $2/7=0.29$  (29%) and the unique coverage score is  $0.43-0.29=0.14$  (14%). Finally the raw coverage for configuration 2c is  $4/7=0.57$  (57%), the overlap is  $2/7=0.29$  (29%) and the unique coverage lies at  $0.57-0.29= 0.28$  (28%). The coverage scores reveal that the individual relevance of each condition for low intercultural collaboration is different. In addition when focusing on the case level it is visible that one department (D7) disposes of all three unfavorable conditions, two departments (D6 and D8) dispose individually of two unfavorable conditions and four departments (D2, D3, D4 and D14) dispose of one unfavorable condition each.

Table 4: Configurations for low intercultural collaboration (outcome=0)

<b>solution</b>	<b>Configuration 2a</b>		<b>Configuration 2b</b>		<b>Configuration 2c</b>
condition	IC4 {1}	+	IC5 {0}	+	IC2{0}
cases	D4, D6, D7, D8		D2, D6, D7		D3, D7, D8, D14

Note: “+” means logical OR; IC4{1}: financing attendances at academic conferences or events once per year; IC5{0}: research visits are not actively supported; IC2{0}: less than 14% foreign PhD students; D2, D3, D4, D6, D7, D8 and D14: departments in our sample with low intercultural collaboration.

### 4.3 Controlling for resources as robustness-check

High or low intercultural collaboration not only depends on configurations of socializing strategies but we assume that PhD education should also be affected by the resources displayed in a department (Sadowski, Schneider & Thaller, 2008). We therefore control for resource effects by adding five resource conditions (financial resources, extra time, research competence of supervisors, number of supervisors and number of PhD students) to MVQCA. The data for each resource condition always refers to the time between 2001 and 2003.

#### **4.3.1 Financial resources**

Financial funding influences the investments in PhD education (Dillon, 2005; Graham & Diamond, 1997; Gumport, 2005). We therefore assess “financial resources” in a department as the first resource condition. To account for financial resources of a department the yearly budget would serve best, but this data is not available. As an approximation, we rely on data of additional research funds. We clustered this data according to the three tier classification for third party funding among German economics departments (Berghoff, Federkeil, Giebisch, Hachmeister, Hennings & Müller-Böling, 2006). Accordingly, we set the range between 0 and 200.000 Euro annual funding, 200.001 and 850.000 Euro and above 850.000 Euro.

#### **4.3.2 Additional time**

In addition, supervisors require “extra time” to engage in PhD education. When faculty members devote additional supervision or administrative support to PhD education, they have to withdraw this time from their other activities, like daily routines and duties of a chair and a department, for example. We claim that supervisors engaged in excessive undergraduate education cannot spend much time in teaching PhD students so that extra time will be a crucial resource condition for PhD education. Our interview partners had difficulties estimating the relative amount of time spent on different academic tasks (PhD education, undergraduate teaching, research and self-governance). We therefore constructed an appropriate and reliable indicator for extra time for PhD education among all departments. We did so by dividing the number of faculty by the number of undergraduate students, as indicated on the web pages of the departments, to account for comparable data. Departments with low ratios are considered to have more extra time budgets to spend on PhD education since they have to teach less undergraduate students. The data is divided technically by MVQCA into three clusters. In departments with low time budgets, each faculty member has to teach more than 99 undergraduate students, in departments with medium time budgets, faculty has to teach between 50 and 99 students and in departments with high

time budgets, each faculty member has to teach less than 50 undergraduate students.

#### **4.3.3 *Publication record***

In some economic fields the supervisor's publication record influences the publications by PhD graduates more than the reputation of the PhD granting institutions (Hilmer & Hilmer, 2007). To control for research competence, we assess the average publication record of each faculty member and averaged this data for the department. Due to the national heterogeneity of the sample departments, we assess the publications from the SCOPUS database which accounts for national refereed journals. We divided the condition into two categories according to MVQCA. A department is supposed to have a high research competence when the average publication of each faculty member is above 1.9 publications for the three years under consideration. A department is supposed to have low research competence when each faculty member has less than 1.9 publications.

#### **4.3.4 *Total number of supervisors***

We further assume that the "total number of supervisors" might be important for PhD education. The reasons given vary. In one argument a greater number of supervisors facilitate a successful matching between supervisors and students (Hilmer & Hilmer, 2007). Also larger departments ease switching from one supervisor to another, should the relationship suffer (Lovitts, 2001). We took the number of faculty members from the departments' websites and, based on this data, split them into two categories. Small departments have no more than 10 faculty members and big departments have 10 faculty members and more.

We finally claim that the "total number of PhD students" enrolled in a program should influence PhD education. Yet the effect is unclear. While an increase in PhD completion rates has been found in smaller cohorts (Bowen & Rudenstine, 1992) the opposite is said for graduate schools in economics (Hansen, 1991). To control for the number of PhD students, we divided departments according to the

annual average number of PhD graduates into three categories. Departments with low numbers graduate 5 and less PhD students, programs which graduate between 6 and 13 students are considered medium sized and big programs graduate more than 13 PhD students.

To prevent the results from being arbitrary (Marx, 2006) we add one resource condition at a time to the socializing strategies. This leads to five additional separate calculations for resources in the results.

#### **4.3.5 Results of robustness-checks**

The results for departments successfully stimulating intercultural collaboration are not changed by adding any of the resource conditions. This demonstrates the strong impact of socializing strategies for successful intercultural collaboration beyond resource effects.

Adding the resource conditions does not change the original configurations for departments with low intercultural collaboration except for the two conditions “extra time” and “financial resources”.

When we add “extra time” into the analysis, MVQCA offers an additional configuration to the solution. When faculty members face low budgets of extra time (more than 99 undergraduate students for each faculty member), this condition alone is sufficiently explaining low intercultural collaboration of three departments (D2, D3 and D6).

When the condition “financial resources” is added to the analysis, an additional solution of two configurations emerges: For four departments (D3, D7, D8 and D14) low intercultural collaboration can be explained sufficiently by low numbers of foreign PhD students. The second configuration indicates that the combination of low financial resources (below 200.000 Euro annually) with a medium amount of foreign PhD students (between 14% and 35%) also explains the output of three departments (D2, D4 and D6). The raw as well as the unique coverage is identical for each of both configurations, indicating robust effects of both new configurations. One can see, that having low numbers of foreign PhD

students is harmful for intercultural collaboration but raising the number does not improve the situation when at the same time departments dispose of low financial resources.

## **5 CONCLUSION**

We analyzed the impact of five academic socialization strategies on intercultural collaboration of PhD graduates and demonstrated that only a small set of two strategy configurations enhances collaboration. The results further suggest that low intercultural collaboration is based on three single socializing conditions alone and that resources of departments effect low but not high collaboration.

Our results demonstrate that departments who educate PhD students with different backgrounds in academic disciplines and actively support them to pursue short term research visits are as successful in favoring activities of intercultural collaboration as departments that predominately focus on high numbers of PhD students with different national backgrounds (D11 and D13). Particularly this latter strategy is much in line with PhD programs of American and English research universities. But the former result indicates that departments which do not dispose of such high numbers of foreign students can also stimulate intercultural collaboration of their PhD students when they pursue a strategy of accepting PhD students with a wide variety of different academic disciplines in the program and actively support them on their attempts on short term research visits outside the institution (D1, D5, D9, D10, D11 and D12). By looking deeper in the cases we find that the latter strategy is particularly fruitful for departments where the common language is different than English (D1, D5, D9, D10 and D12), while English is the common language among the former two departments (D11, D13). This finding sheds new light on the design of PhD education of (economics) departments with the goal to improve intercultural collaboration among their PhD students.

The picture for low intercultural collaboration is more complex. Three separate conditions individually explain low collaboration. According to the coverage scores the effects of these individual conditions seem even more severe than the

effects of conditions under the high collaboration conditions. While an overlap of a department with high collaboration indicates that either of its strategies leads to a positive outcome, an overlap of a department with low collaboration indicates that once one of the departments has struggled to leave one unfavorable condition, it is faced with the next one. While departments D4 (configuration 2a), D2 (configuration 2b), D3 and D14 (configuration 2c) dispose of only one unfavorable condition, department D6 (configuration 2a and 2b) and D8 (configuration 2a and 2c) already consists of two unfavorable conditions and department D7 even disposes of three unfavorable conditions (configurations 2a, 2b and 2c). For departments D2, D3, D4 and D14 only a little shift in one of their strategies might change their situation but this is also a question of resources and motivation of course.

Although resources are an important issue in explaining certain success criteria, our results indicate that resources are less dominant as an input factor to enhance intercultural collaboration. Rather the lack of two resources, extra time and financial resources explain low intercultural collaboration.

Altogether, our results demonstrate that enhancing intercultural collaboration is a combination of several socializing strategies which rely on short term as well as long term organizational settings and that there is no one best strategy.

## **6 LIMITATIONS AND OUTLOOK**

In our study we scrutinize whether different socializing strategies of economic departments effect intercultural collaboration of PhD students. We demonstrated that only a few strategies and their combinations lead to high or low intercultural collaboration.

Based on the study design, we have to acknowledge some limitations. As a case study our results rely on a low sample size. By using MVQCA as the analyzing method we had to limit our input conditions to five different socializing strategies that were assessed on a nominal scale level. We were able to find and weight typical configurations but it is not possible to apply statistical methods

and to calculate relative influence of each condition. Statistical analysis still remains to be done.

Success was defined as joint publications of PhD students with scientists from research institutions of English speaking countries as proxy for intercultural collaboration but without doubt other means of measuring intercultural collaboration are also legitimate.

Our study focuses only on one discipline in one research area, economics departments in continental Europe. An extension to less standardized academic fields or universities from a different cultural background might shed more light on the influence of socializing strategies in PhD education. It would be of further research interest to scrutinize the effects of alternative socializing strategies to enhance intercultural collaboration in the higher education sector.

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