

# Matching Strategies of Heterogeneous Agents in a University Clearinghouse\*

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## Abstract

In actual school choice applications the theoretical underpinnings of the Boston Mechanism (BM) (complete information and rationality of the agents) are often not given. We analyze the actual behavior of agents in such a matching mechanism, using data from the matching mechanism currently used in a clearinghouse at Paderborn University, where a variant of BM is used and supplement this data with data generated in a survey among students who participated in the clearinghouse. We find that under the current mechanism over 70% of students act strategically. Controlling for students' limited information, we find that they do act rationally in their decision to act strategically. However, we do not find evidence that they follow any of the strategies advised in the literature. While students thus seem to react to the incentives to act strategically under BM, they do not seem to be able to use this to their own advantage.

**Keywords:** Matching, Application of the Boston Mechanism, School Choice, Strategic Behavior

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# 1 Introduction

Since Abdulkadiroğlu and Sönmez (2003) seminal paper on school choice as a mechanism design problem, school choice has become a very widely researched field in the mechanism design literature. This is in part due to its importance for education research and policy, as well as the amount of open questions that still remain in this field. The main discussion in the literature is to find an implementable and fair mechanism to divide students among schools. So far the three main mechanisms that have been proposed in the context of the school choice literature, are the Boston School Choice Mechanism (hereafter BM), the Deferred Acceptance Mechanism (also known as the student-optimal Gale-Shapley Algorithm (Gale and Shapley, 1962), hereafter DA) and the Top Trading Cycle (hereafter TTC). The BM, as described in Abdulkadiroğlu et al. (2005), is a commonly implemented mechanism in school choice situations.<sup>1</sup> It has, however, received a lot of attention, as it is not efficient, it does not eliminate justified envy, and it is not strategy proof, thus giving incentives to misrepresent one's preferences (see, e.g., Chen and Sönmez (2006)). The other two mechanisms, have better theoretical properties, but are not implemented as frequently as BM in real school choice situations.

This may be partly due to the fact that while DA and TTC theoretically have more desirable properties than BM, lots of parents seem to prefer BM, as it gives them at least some way to influence which school their child will attend (see, e.g., Chen and Sönmez (2006)). Additionally, research has shown that if not all theoretical assumptions are fulfilled, the BM may not be such a bad choice of mechanism after all. For example, Abdulkadiroğlu et al. (2011), show that if schools do not have strict priority rankings over students and students are not fully informed, naive players may actually prefer BM over DA. While there are some experimental papers on the differences between the mechanisms in different circumstances (most notably see Chen and Sönmez (2006) who are the first to experimentally compare the mechanisms, Pais and Pintér (2008), who analyze the role of different information settings on the outcome of the mechanisms, and Calsamiglia et al. (2010)), who look at the influence of outside option on the behavior of students), empirical evidence on the behavior of players in the mechanisms is lacking.<sup>2</sup> This is due to the fact that in most school choice situations, the only available information is the ex-post outcome of the matching, as well as the stated preferences of the students. What we do not see are the true preferences of players and if they actually do behave strategically and how this influences the outcome of the matching mechanisms for strategic and honest participants.

In this paper we use data from a clearinghouse that is used for the distribution of Bachelor and Master theses amongst different chairs at the faculty of Business Administration and Economics at the University of Paderborn. In the clearinghouse, a mechanism is used that is very close to the standard BM. Here, we get the 'standard' school choice data: the allocation of students across chairs, as well as the students' preferences. We supplement this data with data gained from a survey among students who took part in the clearinghouse. Here we collect data on students true preferences, their motivations as well as their estimation of chances at the different chairs and some general information. By means of this combined data set, we are able to not only analyze the outcome of the matching mechanism, but we are also able to analyze the behavior of students in the matching mechanism and how this behavior influences the outcome of the mechanism. Additionally, we use the combined data set to analyze whether students, given the fact that they do not have full information, are able to estimate their chances at a given chair correctly, and whether, given their own estimation, they behave rationally.

The paper is organized as follows. In Section 2 we shortly introduce the Boston Mechanism and its application at the faculty of Business Administration and Economics at Paderborn University.

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<sup>1</sup>For a list of places BM has been used see Abdulkadiroğlu et al. (2011, p.409).

<sup>2</sup>A notable exception is a very recent working paper by De Haan et al. (2015), who also use a questionnaire to look at how students (parents) in Amsterdam behave in a type of Boston mechanism setting, when choosing their secondary school.

In Section 3 we introduce the Data we collected. Following this, we analyze the data with respect to the behavior of students in the mechanism in Section 4, and build a model to analyze the rationality of their expectations and their consecutive behavior. Finally, we conclude in Section 5.

## 2 The Boston Mechanism and its application at Paderborn University

The BM, is a mechanism that has been used in numerous school choice situations. It is a mechanism that is fairly intuitive and easy to understand. In the following, we follow the description of the BM given in Pathak (2011). Assume we have a set of students with strict preferences over the schools they would like to attend and a set of schools with priorities over students and a given number of available places. The students submit their list of preferences and then the mechanism begins. In the first round only the first choices of students are considered. Each school considers the students who listed it as their first choice and assigns places to fill their capacity, starting with those students that are highest on its priority list. If a school fills its quota in the first round, they exit the algorithm. If capacity is left after the first round, the school remains in the algorithm for the next round. Schools then only look at those students who are not yet matched and who listed the school as their second preference. Again the schools start with those students with the highest priority. The mechanism terminates when all students are distributed to a school of their choice, or, those students that remain unassigned have exhausted their preference list.

Every term students have the possibility to write their Bachelor or Master thesis at the faculty of Business Administration and Economics at the University of Paderborn (from here on UPB). Since the winter term 2012/2013, a web based matching mechanism is used to manage the allocation of students across chairs. The stated goals of this mechanism are to guarantee that each student will find a supervisor in the given term, and to spread the task of supervising theses in a fair way across chairs. To obtain this, the faculty implemented a web-based version of the BM, in which students state their top three preferences for chairs at which to write their thesis. Additionally students are required to upload an overview of their current grades and a CV. Some chairs also asked for some additional material, such as a letter of motivation, a proposal, etc. Once all students have uploaded their choices, a quota is calculated to determine how many theses need to be supervised by each chair. To calculate this quota each Bachelor thesis is given a value of 1, each Master thesis a value of 1.5. The points are added up and the flex quota is calculated by  $\frac{points}{FTE_{total}} * FTE_{chair}$ , where FTE stands for full time equivalent position. The quota is called a flex quota because chairs are free to supervise more than their allotted number of students. The mechanism then follows the Boston mechanism, such that chairs begin to fill their quota from only those students who consider the chair their first preference. After three rounds, the remaining students will be divided up between chairs that still have free capacities.

For our analysis we assume that what we are looking at here is indeed a 1-sided matching. Thus, we assume that the chairs are not strategic players themselves but rather have priorities over students. We come to this conclusion following data that was collected in a Bachelor thesis on the clearinghouse (Steuber, 2014). Here, a survey was conducted amongst the different chairs who take part in the matching mechanism, in which they were asked how important for their selection of students the following statements were: Chosen courses, Grades in related courses, Documented interest and motivation, Average grade in studies, CV, and Other factors. Steuber (2014) found that a large majority of chairs ranked these options almost identical. Chosen courses, grades in related courses and documented interest and motivation were the most important deciding factors for 83% of the chairs. The average grade was the next most important point and CV and other factors were less important. As chairs thus mostly decide based on the same criteria, we decided for the remainder of this analysis to treat our matching problem as a 1-sided matching, where

chairs have priorities in the order of the stated items listed above.

### 3 Data

The data we use in this paper is based on the two terms for which we also conducted the survey. Therefore we have 281 students in the winter term 2014/2015 and 423 students from the summer term 2015. For each of these students we have data on their three most preferred chairs, in which round they were allocated and which chair they were allocated to. Also for each of the around 30 participating chairs, we have data on their flex quota and how many students they choose to supervise. This data we have supplemented with the data from an incentivized survey.<sup>3</sup>

We conducted the survey amongst all students who took part in the matching mechanism in the winter term 2014/2015 and in the summer term 2015. We send out the survey, after the matching mechanism had already been conducted and students had started to write their thesis. For the winter term 2014/2015 we received 66 completely filled out surveys (which corresponds to a response rate of 23.5%).<sup>4</sup> For the summer term 2015 we received 128 completely filled out surveys, which corresponds to a response rate of 30.3%. As we adapted the survey slightly before sending it out for the second time, most of our analysis will be based on those 128 surveys from the summer term. Amongst those students who participated in the survey, we ran a lottery of two 25 Euro vouchers for Amazon each term.

The survey consisted of 45 questions, covering basics such as age, gender and which major they were studying, as well as questions on the matching mechanism, also giving students plenty of room for their own comments. The questions that are of most importance to this analysis consisted of questions about the three chairs they stated to be their top three preferences in the matching mechanism, how high they estimated their chances at these chairs, if they misrepresented their choices, whom would they have chosen otherwise and why did they misrepresent, as well as how content they were with the mechanism, the information they received and their allocation. Additionally we asked some more general questions about their studies and the matching mechanism, why they chose the chairs they have stated, and asked them to fill out a list of up to 15 chairs were they would not want to write their thesis because, e.g., they did not take any courses at these chairs.

We performed a number of statistical tests to analyze whether there was any selection bias in the survey data. Therefore we compared the data from the survey with the data from the actual mechanism to ensure that we indeed had a representative sample. We compared the data with respect to five different dimensions: the distribution of gender, type of thesis, allocation to a chair within one's preferences, allocation to first preference and finally we also looked at the ranking of chairs in terms of how often they were chosen by students. Performing chi square tests for the distribution of gender, thesis type, allocation to a chair within one's preference and allocation to one's first preference, we do not find any statistically significant differences between the survey data and the data from the mechanism.<sup>5</sup> This can be seen in Table 1.<sup>6</sup>

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<sup>3</sup>An English translation of the survey from the summer term 2015 can be found in the appendix.

<sup>4</sup>As we probably did not reach all students, as we had some wrong email addresses and we send out the survey quite late in the term so some people might have already left university, the actual response rate out of those students who received the email is probably closer to 30%).

<sup>5</sup>We also compared the distribution for allocation to second and third choice and do not find any statistically significant differences either.

<sup>6</sup>The number of students in the test for the thesis type is only 127 in the survey (as compared to the 128 everywhere else) as one student wrote a special kind of thesis, that students from different disciplines can write at the economics faculty. As there are only very few of these theses, we are ignoring them in the analysis however.

	Gender		Thesis		Top3		First Choice	
Data	Female	Male	MA	BA	Yes	No	Yes	No
Mechanism	243	180	115	304	377	46	305	118
Survey	78	50	37	90	111	17	94	34
$\chi^2$ Test	Pr=0.483		Pr=0.710		Pr=0.453		Pr=0.767	

Table 1: Is the survey data biased?

Concerning the frequencies with which any given chair has been selected as a first preference, we ranked the chairs according to how often they were chosen. We find that the distributions here are remarkably similar. All in all we thus conclude that the survey data indeed is a representative sample for the data from the actual mechanism we observe.

## 4 Analysis

In this section, using our merged data set, we analyze how the students actually behave, when facing a real life BM. In a first step, we looked at how often students did not give their true preference in the matching mechanism. Theory predicts that they act strategic and manipulate their stated preferences in order to improve their match (Abdulkadiroğlu and Sönmez, 2003). To check whether this prediction holds in reality we asked the students to state their preferences, they already stated in the clearinghouse, as well as the true preferences. It turns out that about 74%, which means almost three quarters of the students have manipulated their preferences in the clearinghouse. This is in line with the data that Chen and Sönmez (2006) find in their experiment, where around 80% of subjects misrepresented their choices. Surprisingly, this percentage does not differ significantly over gender, study achievements or experience, which we measure with the help of the type of thesis. We assume that Master students have already experienced a clearinghouse in their Bachelor studies. Running  $\chi_2$  tests to check for these factors, we do not find a statistical significance for differences in strategic behavior. You can find the results of the test in Table 2.<sup>7</sup>

	Gender		Study Achievement		experience	
Misrepresentation	Female	Male	good grades	mediocre grades	Bachelor	Master
No misrepresentation	18	15	25	8	23	10
Misrepresentation	60	35	58	37	67	27
$\chi^2$ Test	Pr=0.382		Pr=0.127		Pr=0.864	

Table 2: Misrepresentation for different participants groups

The students act strategically in a clear pattern, almost all of them manipulate their third choice and additionally their second choice or even their first and second choice. In all, about 23.4% of the students who misrepresented at least some preferences, only manipulated their third and last choice, about 22% were strategic about their second and third choice and about 19.5% were not honest about all three choices. No one misrepresented her first choice only. Table 3 shows how misrepresentation is split up between the different preferences.

<sup>7</sup>We have also tested all combinations of misrepresentations without finding statistical significant differences.

Manipulation	Frequency	Percentage
1st misrepresented	0	0
2nd misrepresented	8	6.25
3rd misrepresented	30	23.44
1st and 2nd misrepresented	2	1.56
1st and 3rd misrepresented	2	1.56
2nd and 3rd misrepresented	28	21.88
all misrepresented	25	19.53

Table 3: Which preferences are misrepresented?

#### 4.1 Do the students act rationally?

Obviously, students misrepresents their preferences and thus, seem to act strategically. But does this misrepresentation improve their personal outcomes? To do so, they have to act rationally and be aware of the consequences of their actions. If there was complete information and the students were well-informed, we could easily check, whether they act rationally. We would expect that the students report their preferences in such a way, that they exploit the algorithm to maximize their payoff or more precisely get the highest possible true choice. Unfortunately, complete information is not given here as it is not in many real life situations. The question we want to answer now is whether the students act as rationally as they can or not.

**Definition 1.** An agent, here a student, acts *limited rationally* if she chooses the strategy that maximizes her outcome given the incomplete information she has.

More precisely, limited rationality means, that the students are able to evaluate whether they should tell the truth or choose another chair where they believe to have rather high chances. Unfortunately, students do not seem to act limited rationally at the first glance. We asked the students to self-assess their chances at their stated and their true preferences. Under BM we expect them to not give their true preferences if they estimate their chances to be very low there and instead name a chair where they at least think that their chances are as good as before, perhaps even better. But do they really act rationally in their decision which chair to state as a first preference if they do not state their true preference. As can be seen in Table 4, we find that students do not act in such a way. Here we coded all those changes as sensible, in which students gave a stated first preference for which they estimated their chances to be at least as high as for their true first preference. However, we see that 41% of students do not act in such a fashion. Instead they give as a stated preference a chair where they estimate their own chances to be strictly lower than at their true first preference.

Sensible Change from true to stated 1st preference	Frequency	Percentage
No	12	41.38%
Yes	17	58.62%

Table 4: Do students state chairs at which they estimate their chances to be higher than at their true preference if they act strategically?

Thus, a lot of students try to act strategic but really fail in improving their personal outcomes. But does this mean that they are not limited rational at all? Do students really act simply silly and irrationally? We doubt this because the decision we are looking at is very important for

students and has a great impact on their ongoing career. Therefore, we believe that students are not fully informed about the clearinghouse mechanism although the information about it is available to them.<sup>8</sup> We believe that students act limited rationally according to their knowledge and are simply not aware of the functioning of the clearinghouse. We have some anecdotal evidence on that because we asked the students directly if they have understood the mechanism properly and why they decided to choose a certain chair. For both types of question we got back some quite interesting answers which suggested that this was not the case.<sup>9</sup>

To test our hypothesis that the students are limited rational we examine the following. Limited rationality requires that students know how to estimate their chances. Afterwards, they have to decide based on these estimations whether they could risk to choose their true choices as stated ones or if they should deviate and act strategically.

#### 4.1.1 First step: estimated chances

Before we check whether students are able to estimate their chances correctly we have to make sure that they indeed only have incomplete information concerning the occupancy rate  $a$  of their preferred chairs. Therefore, we first test whether students are able to tell if their chosen preferences belong to the most highly demanded chairs or not. We coded as full all those chairs that had no more available capacity after the first three rounds of the matching mechanism and as empty those who have available capacity. In the questionnaire, we asked students which chairs they thought had the highest occupancy rates and then analyzed whether students believed that their chosen chairs were amongst those or not. We find that for their first preferences, stated as well as true, roughly three quarters of students are able to correctly choose if the chair they chose is full or not (73% and 78%, respectively). This number drops to roughly 60% for their third preference. Analyzing if students systematically under- or overestimated the occupancy rate of their first chosen preference, we find that they significantly underestimate whether their first stated (and true) preference belongs to the fullest chairs ( $\chi^2$ -test with  $p < 0.01$  for both stated and true preferences). We therefore deduce that students indeed only have incomplete information about the occupancy rate  $a$  of any given chair.

Given this information we analyze whether students are able to estimate their chances correctly. Although the exact preferences of the other students taking part in the clearinghouse remain unknown, each student  $s$  has some beliefs about the popularity and therefore the occupancy rate  $a$  of each chair. Additionally, she assesses her own performance  $l$  at the particular chair so far. These two factors determine the chances of success at the particular chair  $c$  the student believes to have  $m_c(l, a)$ .

**Hypothesis 1** If student  $s$  performs very well at chair  $c$ , she will expect to have higher chances to be allocated to it.

Performance is an important factor for the decision-making of chairs. We assume that the students know this fact. Additionally, a good performance indicates a student's interest for the research topics offered at the particular chair. Therefore, we expect that the better the performance of a student  $s$  is at a particular chair, the higher she would estimate her chance to be allocated to it. We model *performance* as an ordinal variable with 6 possible outcomes, *no attended courses*, *no finished courses*, *bad performance*, *mediocre performance*, *rather good performance* and *good performance*. The students were asked to evaluate their performance for each chair separately.

**Hypothesis 2** If student  $s$  expects the occupancy rate at chair  $c$  to be low, she will expect to have higher chances to be allocated to it.

<sup>8</sup>Admittedly, some effort on their side is involved to get this information.

<sup>9</sup>You can find some examples in the appendix.

If a chair is not very popular and thus, only few students put this chair on a high rank in the preference list, the chair is more likely to accept the student  $s$  in order to fulfill its quota. The student will expect this behavior if she believes that the chair does not fulfill its quota after the first three rounds of the Boston School Choice Mechanism. As we have already pointed out, the exact occupancy rates remain unknown.

If a student assessed her performance at the chair was good and the occupancy rate to be low, the chances should be estimated to be high. Similarly, if she assessed her performance at the chair was bad and the occupancy rate to be high, the chances should be estimated to be low. In the other cases, if the performance was good but the occupancy rate was high or the other way round, the behavior should depend on what the students believe to be more crucial. You could also say that this depends on their risk aversion. If students are more risk averse, their estimated chances would be relatively low in order to eliminate the uncertainty.

$l \uparrow a \downarrow$ High chances	$l \downarrow a \downarrow$ ?
$l \uparrow a \uparrow$ ?	$l \downarrow a \uparrow$ Low chances

Table 5: Estimated chances depending on performance  $l$  and occupancy rate  $a$

The estimation of the chances might also depend on some other factors we control for.

#### *Thesis type*

If a student writes a Master thesis, a chair gets a higher value for supervising her. Thus, a Master student is more likely to expect a high chance of being allocated at a given chair than a Bachelor student.

#### *Overall performance*

For a chair, also the overall performance matters in its decision-making process. Thus, the higher a student's overall performance in her studies is, the more likely it is, that a chair accepts her. Students should also be aware of this fact. Therefore, we control for a student's overall performance.

#### *Missing Credits*

The amount of missing credits might also play a role. The more credits are missing, the longer does it take for a student to end her studies. Thus, she might act more risk loving and estimates her chances higher than students in their last semester.

To see whether, given their beliefs about their own performance  $e$  and the occupancy rate of any given chair  $a$ , students behave limited rationally, we firstly perform an ordered logit regression on their estimation of their own chance at their chosen (stated and true) preferences. We chose for the ordered logit measure, as the dependent variable, the students' estimation of their own chances at their chosen preference, is a categorical variable, ranging from low to rather low to rather high to high. The results of the regression analysis can be found in Table 6. In specification (1) we use just the two variables we are mainly interested in: *Assumption that the chair is full* and *Performance at the Chair*. In specification (2), we add the control variables, which are, however, all not significant.<sup>10</sup> All ordered logit regressions are run only for those students who did not state that they were accepted at a given chair before the matching mechanism started.

As can be seen from Table 6, the only variables that significantly influence the way students estimate their chances at a given chair are their beliefs about the occupancy rate of the chair, which has a negative influence, and whether their own performance at the chair was good, which has a positive influence. This matches our Hypotheses 1 and 2 perfectly. Adding the controls does

<sup>10</sup>We give the results for the regressions with the categorical variables here. However, also when the variables are taken as continuous, none of the controls are significant.

	True First		Stated First	
	(1)	(2)	(1)	(2)
Assume Chair is Full	-.8272** (0.3841)	-1.0556** (0.4501)	-.5339 (0.3754)	-.5329 (0.4346)
Performance at Chair (base category: no courses)				
Bad	-.6684 (1.5661)	-.9462 (1.8304)	-1.4356 (1.2754)	-1.7961 (1.6467)
Mediocre	-.4993 (0.7772)	-.2403 (0.9041)	-1.2198 (0.7900)	-1.1207 (0.9650)
Rather Good	.4410 (0.6318)	.6515 (0.7057)	-.2814 (0.6528)	.1635 (0.7435)
Good	1.6464** (0.6776)	2.0017*** (0.7688)	1.2798* (0.6917)	1.5971** (0.7837)
Study Results (base category: bad)				
Average		-.3691 (1.7874)		-1.1214 (1.5107)
Good		.0871 (1.829)		-1.3424 (1.5564)
Very Good		.1679 (1.9385)		-1.2232 (1.6747)
Missing ECTS (base category: < 10)				
10 < Missing ECTS ≤ 20		-1.4947 (0.9666)		-.8504 (0.9706)
20 < Missing ECTS ≤ 30		-.9117 (0.8990)		-.4449 (0.9168)
30 < Missing ECTS ≤ 40		-1.3483 (1.0452)		-.5470 (1.0375)
40 < Missing ECTS ≤ 50		1.1891 (1.5322)		.2433 (1.6157)
50 < Missing ECTS ≤ 60		.0280 (1.3235)		.5555 (1.3579)
Master		.4190 (0.4489)		-.1264 (0.4348)
Observations	121	105	123	107
	Standard errors in parentheses *** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.1$			

Table 6: Ordered Logit of estimated chances at a given chair

not change these results and shows that the students' own estimation of chances at a given chair does not depend on other factors. Interestingly, for their stated first preference the occupancy rate of the chair is not longer significant.

#### 4.1.2 Second step: strategic action

Given that students are able to estimate their chances at their first preference rather well, we will now analyze if they also behave according to our definition of limited rational behavior when deciding whether they should give a true first preference or act strategically.

**Hypothesis 3** A student who expects her chances to be relatively high at her true first, second or third choice should be more likely to state exactly this chair within the clearinghouse.

If she expected the chances to be low, she would choose an alternative chair to state in the clearinghouse. Whether a student sticks to her true choice might also depend on some other factors we control for.

##### *Gender*

Other studies like Niederle and Vesterlund (2007) suggests that men are more often overconfident, e.g. by entering a tournament. Therefore, we expect women to deviate more often from their true choice in order to decrease their risk of staying unmatched.

##### *Age*

We assume that age might also play a role. Nevertheless, the sign of this interaction is not clear. On the one hand, older students have more experience and thus, are better informed. So they are more sure in estimating their chances and thus, do not deviate from their true choice so often. On the other hand, they might be more afraid of staying unmatched because they want to finish their studies more quickly. In this case, older students would deviate from their true choices more quickly than younger students.

To test this, we use a probit analysis to see whether their own estimated chances are a good predictor of giving a true first preference or not. Again we first use a specification without controls and then with controls. The results can be found in Table 7, where as before we only look at those students who were not accepted at a chair before the matching mechanism started.

	(1)	(2)
Chances at true 1st preference (base category: low)		
rather low	.0704 (0.4677)	.1257 (0.4999)
rather high	.7626* (.3937)	.8957** (0.4184)
high	.7915** (0.3658)	.8588** (0.3964)
Female		-.5392* (0.3116)
Age		.0850 (0.0822)
Observations	125	111
	Standard errors in parentheses *** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.1$	

Table 7: Probit of stating one's true first preference

Looking at the results of the probit regression in Table 7, we find that as compared to estimated low chances at their true first preference, significantly more students will state their true first preference in the matching mechanism if they estimate their chances to be high or rather high. This matches with our Hypothesis 3. Additionally we find that if we control for gender, females are significantly less likely to state their true first preference. This result is in line with the gender gap in, for example, tournament entry (see, Niederle and Vesterlund (2007), where the gender gap in entry into competitive environments is mostly attributed to more male overconfidence).

Summing up, the students really act limited rationally until this point. If they fail later, this seems to be a problem of incomplete information and not of irrationality. This means, be aware of the fact that limited rationality does not ensure a positive outcome for the students in the end. Incomplete information might lead to even worse outcomes. Not only the information about the mechanism might be incomplete but also the chances might be estimated based on wrong assumptions. If a student believes to have a good performance at a chair, this must not be the assessment of the chair. And even more crucial, students might not be aware of the true occupancy rate of a chair. These false beliefs affect the estimation of chances of their true choices as well as the estimation of the chances of their stated choices.

## 4.2 Strategies and Strategic vs. Naive Players

To find evidence for our conjecture that the students are really not informed about the matching mechanism, we have a closer look at the patterns of misrepresentation. In the School Choice literature, different advice on strategies that has been given to students on how to get the best results in the BM, has been documented and theoretical papers have discussed the possible exploitation of naive players by sophisticated or strategic players. We analyze our data to see whether any strategies can be detected. If these strategies were widely used in a reasonable way, this would give us a hint, that the students would actually know at least a bit about the Boston School Choice Mechanism.

Chen and Sönmez (2006) focus on what we call the ‘Minneapolis Strategy’ and the ‘Seattle Strategy’. Both are named for the towns in which they were advocated by newspapers and placement agencies.<sup>11</sup> Both strategies advocate misrepresentation, however, how to misrepresent differs between strategies. While the Minneapolis Strategy advocates that one should give a true first choice and then use ‘realistic’ second and third choices, the Seattle Strategy advocates selecting one’s first choice according to where one has high chances of being accepted. Both strategies build on the fact that in the BM a very high weight is placed on the first choice, with the second and third choice being mostly ‘backup options’. This is verified by the data which by and large states that in the BM a huge majority of students is allocated to their first stated preference (see, e.g., Chen and Sönmez (2006) who states that in a Cambridge school choice mechanism 75% of students obtain their first choice). In our data set this can also be observed, as 72.1% of students were allocated to their first choice in the mechanism and 74.6% were allocated to their first choice in the survey data.

Looking simply at the number of students who misrepresent in line with one of our proposed strategies, we find that 51.56% of students follow what appears to be the Minneapolis strategy. They state a true first preference and misrepresent their second and/or third preference. The Seattle strategy in its most basic sort - simply misrepresenting the first choice - is used by 22.66% of students. For both strategies we find insignificant differences between Bachelor and Master students. Although, both strategies are used more often by Master students this difference is not significant as a  $\chi_2$  test shows (cf. Table 8).

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<sup>11</sup>Note that in Amsterdam, after returning to the Boston Mechanism for the school year 2016, the official association of all school administrations for secondary education, OSVO, actually advises on its Website to act strategically (Vereniging Osvo, 2015).

<b>Experience</b>	<b>Minneapolis Strategy</b>		<b>Seattle Strategy</b>	
	Yes	No	Yes	No
Bachelor	44	46	23	67
Master	21	16	6	31
$\chi^2$ Test	Pr=0.42		Pr=0.255	

Table 8: Usage of Strategies

Having a closer look at the two strategies, we find that about half of the students who use the Minneapolis strategy, more precisely use what we call a strict Minneapolis strategy. They thus misrepresent both their second and third choices. For the Seattle strategy, the number of students who misrepresent their first choice is a lower bound. As it advises only to think strategically about a first choice where one also has high chances, students who do not misrepresent their first choice might also follow this strategy. However, as we have seen in section 4.1, while students follow the strategies on the surface, they do not manage to chose the right alternative chair to switch to. Thus, instead of increasing their chances by following the Minneapolis or Seattle strategies, they more often than not actually decrease it.

But does this mean that they really understand the BM? The simple usage of a strategy must not be rational behavior. More precisely, the two strategies are somehow contradictory to each other. The Minneapolis strategy advocates to give a true first choice and the Seattle strategy advocates to be strategic particularly about the first choice. Which strategy should a rational student choose? While these two strategies, at first glance, seem to be opposed to one another, they can both be rational, depending on how high students estimate their chances to be accepted at their true first choice. To make the Seattle strategy rational, students who misrepresent their first preference, should estimate their chances to be accepted high at their stated first preference and should estimate their chances to be lower at their true preference, than those students who do not use the Seattle strategy. Comparing students' estimations of their chances at their true first preference, we find that while 80.8% of students who do not use the Seattle strategy estimate their chances to be high or rather high at their true first chance, only 51.72% of students who do use the Seattle strategy do so. However, we do not find that the students estimate their chances at their stated first preference to be significantly higher than at their true first preference. To make the usage of the Minneapolis strategy rational, students need to estimate their chances at their first preference to be high and chances at their stated second and third preference to be rather high as well. We find that 84.85% of students who use the Minneapolis strategy estimate their chances at their first preference to be high or rather high, as compared to 62.9% of students who do not use the Minneapolis strategy. However, we do not find any difference in the estimated chances of their true second and third preference compared to their stated second and third preference, which we would expect to find. Also looking at the reasons for misrepresenting the students could give in the survey, we do not find evidence for them misrepresenting their second and third choice to have higher chances at those chairs.

To analyze whether the use of the strategies is advantageous to students, we will analyze how many of them have been allocated to one of their top three preferences and how many of them were satisfied with their allocation. We do not find any difference in the allocation to one of their top three preferences between those students who misrepresented and those who did not. Those students who did not misrepresent at all, were actually slightly more content with their allocation than those who did misrepresent. Comparing this to the the results discussed in Abdulkadiroğlu et al. (2015) and Pathak and Sönmez (2008) which state that naive players will be exploited by strategic players in the Boston mechanism, we do not find any evidence for this. Our results seem to be more in line with the intuition given in Abdulkadiroğlu et al. (2011) which states

that naive players may well benefit from the presence of strategic players, as they tend to not use overdemanded preferences as their first choice, even though they might have gotten a place there.<sup>12</sup> Looking simply at the allocation to their stated preferences, we find that there is no statistically significant difference between those students who misrepresented and those who did not misrepresent in whether they were allocated to one of their top three stated preferences or not (Fisher’s exact test with  $p = 0.758$ ). However, when looking at the allocation to their their top three true preferences, we find that naive players get one of their top three true preferences 88% of the time, whereas strategic players only get one of their top three true preferences 74% of the time. This difference is not only economically but also statistically significant ( $p = 0.093$ ). While those students that get one of their top three true preferences are more content than those who do not ( $p < 0.001$ ), we do not find any statistically significant difference in contentedness between strategic and naive students (Fisher’s exact test,  $p = 0.279$ ).

More in detail, we can see that while the usage of the Minneapolis strategy leads to an increase in being allocated to one of one’s preferred three chairs and also to an increase in the satisfaction with the allocation, the usage of the other strategies decreases these values.<sup>13</sup> For both strategies this may be explained by the estimated high chances of actually getting one’s first choice. Looking at the allocation, we find that out of those students who use the Minneapolis strategy, 83.08% were indeed allocated to their first choice, which for both strategies is significantly more than for those students who did not use one of the strategies.

Concluding, we see that the BM used in the clearinghouse definitely gives incentives to misrepresent and that students try to act accordingly. However, while the strategies as such may be rational options, we do not find evidence in the data that students actually use them in a rational way. Thus, this suggests that the students do not in fact understand how the mechanism works. What we see in the data is that students understand quite well how the chairs form their priorities and are therefore able to estimate their chances at a given chair quite accurately. Contrary to what has been proposed in some parts of the literature, we do not find that naive students are hurt by the presence of strategic players. Instead, we see that naive players are actually more satisfied with their allocation and also - on average - are allocated more frequently to one of their preferences than strategic students.

## 5 Conclusion

Using data from the allocation of Bachelor and Master theses to supervisors at the faculty of Business Administration and Economics at Paderborn University, as well as data from a survey conducted amongst the participants of this matching mechanism, this paper is one of the first papers that looks at how agents behave when facing an allocation that is governed by a BM. We find that a majority of our students behaves strategically in the matching mechanism for at least one of their three stated preferences. Analyzing whether acting strategically is actually rational, we find that while students estimate their chances at a chair rationally and also understand the incentives that BM gives to act strategically, they do not follow any of the strategies proposed in the literature, such as the so-called ‘Minneapolis Strategy’ or the ‘Seattle Strategy’(see, e.g., Chen and Sönmez (2006)). Instead, almost half of the students who do not give their true first preference, actually use a stated preference where they estimate their own chances to be lower than at their true first preference. This hints to the fact that the students in fact did not fully

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<sup>12</sup>Please note that the term ‘naive’ players may actually be a misnomer here. We use it to keep in line with the literature, however, what is meant by it is simply students who do not misrepresent. This need not be ‘naive’, as it may be very well rational to do so.

<sup>13</sup>For the Minneapolis strategy, especially looking only at those students who are ‘very content’ with their allocation we find that 69.70% fall into this category when using the Minneapolis strategy, whereas only 46.77% of students who do not use the Minneapolis strategy fall in this category.

understand how the matching mechanism works. The implication of this is that not only has BM less desirable theoretical properties than DA or TTC, but if not properly understood, it actually leads to a worse outcome than if students behaved naively. In terms of a policy implication, a first idea would be to more fully explain the BM to the participating students. However, this then would probably increase strategic behavior, which is not in the interest of the mechanism designers in this setting. Additionally, this could lead to the case of naive students being taken advantage of, as in the discussion by Abdulkadiroğlu et al. (2015) and Pathak and Sönmez (2008).

In a next step, we will therefore analyze whether recommending the DA or TTC as an alternative mechanism would solve these problems. We thus plan to analyze whether either one of these mechanisms would improve the outcome of the clearinghouse. As truth-telling is a dominant strategy in these mechanisms, we assume that students will no longer act strategically. However, for example, Abdulkadiroğlu et al. (2011) show that if schools do not have strict priority rankings over students and students are not fully informed, naive players may actually prefer BM over DA. Therefore, we will use simulations to compare how the outcome would be influenced by using DA instead of BM. Furthermore, given the specifics of our version of BM, we will analyze if traditional stability concepts still hold in this context.

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## **Appendix - Anecdotal evidence for incomplete information about the matching mechanism:**

In the following you find some students' comments indicating that they have not understood the matching procedure quite well.

A lot of students actually ask for more information about the mechanism implicating that there is not information given at the moment:

- “Mehr Informationen” (More Information)
- “Mehr Transparenz” (More transparency)
- “Mehr Information über das Verfahren am Anfang des Semesters” (More information about the mechanism at the beginning of the term)
- “Mehr Einblick in den Ablauf des Verfahrens” (More insights about the matching procedure)

Some students also stated that they have not understood anything about the procedure, at least not at the beginning.

- “Wo ist denn bitte die Logik dahinter??” (What is the logic behind this mechanism?)
- “Ja, ich habe es verstanden, aber es hat etwas gedauert.” (It took me quite long to understand the mechanism.)

## **Appendix - Translation of the survey:**

The survey was done in German, as most students at Paderborn University are German speaking. Also the matching mechanism itself is done completely in German, therefore we decided to also keep the survey in German. On the next pages we added a translation of the main survey. Additionally, we asked them in a separate survey for their email addresses for the lottery of the Amazon vouchers. The German version of the survey can be obtained from the authors by request.

# Matching Mechanism

## Personal Information

1. Gender

- Male
- Female

2. Age

\_\_\_\_\_

## Initiatives

3. Are you member of one particular or several student organizations?

- No, I am not a member of any student organization
- Yes, at AIESEC/IAESTE
- Yes, at the Assoziation türkischer Akademiker (engl.: Association of Turkish Academics)
- Yes, at Campus Consult (stud. Unternehmensberatung)
- Yes, at Deutschsprachiger Multinationaler Muslimkreis e.V. (DMMK e.V.) (engl.: Group of German-speaking multinational Muslims)
- Yes, at Du bist nicht allein (engl.: You are not alone)
- Yes, at Europas Studenten bauen auf internationale Zusammenarbeit e.V. (Eurobiz) (engl.: European Students rely on International Cooperation)
- Yes, at GoAhead!
- Yes, at Hochschulgruppe Spieleabend Paderborn (engl.: University Group of Bord Game Parties Paderborn)
- Yes, at Internationaler Studierenden-Kreis russischsprachiger Akademiker (ISKRA) (engl.: International Students Group of Russian-speaking Academics)
- Yes, at Kickerliga Paderborn (StudyLife Paderborn e.V.) (Kicker League Paderborn)
- Yes, at Kurdische Studierendenvereinigung in Paderborn (KurdS-Pb) (Group of Kurdish Students in Paderborn)
- Yes, at Marketing zwischen Theorie und Praxis (MTP e.V.) (engl.: Marketing between Theory and Practice)

- Yes, at Model United Nations – University of Paderborn (PaderMUN)
- Yes, at oikos
- Yes, at Paderborner lesbische und schwule Studierenden & Friends (PlusS) (engl.: Lesbian and Gay Students Paderborn)
- Yes, at Persisch Sprachige Studierende (PSS) (engl.: Persian-speaking Students)
- Yes, at Programm kino Lichtblick e.V. (engl.: Arthouse Cinema Lichtblick)
- Yes, at Studentenbibelkreis Paderborn (SBK) (engl.: Students' Bible Study Group Paderborn)
- Yes, at Suryoye
- Yes, at universal
- Yes, at UPB Racing Team
- Other: \_\_\_\_\_

4. Are you a member of one of the following student associations?

Please choose only one of the following answers:

- No
- Yes, at Fachschaft Wirtschaftswissenschaften (engl.: Student Association of Economic Sciences)
- Yes, at Fachschaft IBS (engl.: Student Association of International Business Studies)
- Yes, at Fachschaft Winfo (engl.: Student Association of Business Information Systems)
- Yes, at Fachschaft Wing (engl.: Student Association of Industrial Engineering)
- Other: \_\_\_\_\_

## Studies

5. What are you studying?

Please choose only one of the following answers:

- B.Sc. Wirtschaftswissenschaften (engl.: B.Sc. Economic Sciences)
- B.Sc. IBS (engl.: B.Sc. International Business Studies)
- B.Sc. Lehramt an Berufskollegs (engl.: B.Sc. Lectureship to teach at Business Colleges)
- B.Sc. Wirtschaftsingenieurwesen (engl.: B.Sc. Industrial Engineering)
- Other Bachelor Degree Course

- M.Sc. BWL (engl.: M.Sc. Business Economics)
- M.Sc. IEM (engl.: M.Sc. International Economics and Management)
- M.Sc. IE (engl.: M.Sc. International Economics)
- M.Sc. IBS (engl.: M.Sc. International Business Studies)
- M.Sc. Wirtschaftsinformatik (engl.: M.Sc. Business Information Systems)
- M.Sc. MIS (engl.: M.Sc. Management Information Systems)
- M.Sc. Wirtschaftspädagogik (engl.: M.Sc. Economic Education)
- M.Ed. Wirtschaftspädagogik - Lehramt an Berufskollegs (engl.: M.Ed. Economic Education - Lectureship to teach at Business Colleges)
- M.Ed. Lehramt an Berufskollegs – Fachrichtung WiWi (engl.: M.Ed. Lectureship to teach at Business Colleges – Speciality Economic Sciences)
- M.Sc. Wirtschaftsingenieurwesen (engl.: M.Sc. Industrial Engineering)

6. Are you studying in your prospective last semester?

Please choose only one of the following answers:

- Yes
- No

7. How much ETCS were missing in your studies prior to this semester?

Please choose only one of the following answers:

- Maximally 10 ETCS
- More than 10 but maximal 20 ETCS
- More than 20 but maximal 30 ETCS
- More than 30 but maximal 40 ETCS
- More than 40 but maximal 50 ETCS
- More than 50 but maximal 60 ETCS
- More than 60 but maximal 70 ETCS
- More than 70 but maximal 80 ETCS

### **Area of Studies**

8. What is your area of studies?

Please choose all correct answers:

- Management

- Marketing
- Personalwirtschaft (engl.: Human Resource Management)
- Besteuerung (engl.: Taxation)
- Controlling
- Finance
- Produktionsmanagement (engl.: Operations Management)
- Wirtschaftsinformatik (engl.: Business Information Systems)
- International Economics/VWL
- Wirtschaftspädagogik (engl.: Economic Education)
- Recht (engl.: Law)
- Ökonometrie/Statistik (engl.: Econometrics/Statistics)
- No area of studies
- Other: \_\_\_\_\_

9. How would you describe your performance in your studies so far?  
Please choose only one of the following answers:

- Very good
- Good
- Average
- Below average

10. What kind of thesis are you writing at the moment?  
Please choose only one of the following answers:

- Seminar paper
- Bachelor's thesis
- Master's thesis

### **Personal Assessment of the Procedure**

11. How well were you informed prior to the Matching Mechanism about it?  
Please choose only one of the following answers:

- Very well
- Well
- Satisfying
- Poorly

12. Were you informed early enough about the Matching Mechanism? Please use the comment field if you have any comments about the provision of information.

Please choose only one of the following answers:

- Yes
- No

Please write a comment about your decision:

---

13. Did you find all the information about the necessary documents for the Matching Mechanism on the homepages of the chairs?

Please choose only one of the following answers:

- Yes
- Rather yes
- Rather no
- No

Please write a comment about your decision:

---

## Chairs

14. Was it easy to name three chairs?

Please choose only one of the following answers:

- Yes
- No

15. Could you imagine naming more than three chairs in the future?

Please choose only one of the following answers:

- Yes, up to 5 chairs
- Yes, up to 7 chairs
- Yes, up to 10 chairs
- Yes, more than 10 chairs
- No

## Other Applications

16. Did you use exclusively the Vergabeverfahren (engl.: Competitive tendering procedure) of the departments 1, 2, 4, and 5 of the Faculty for Business Administration and Economics to find a chair for supervision?

Please choose only one of the following answers:

- Yes
- No, I applied as described below

Please write a comment about your way of application:

---

## Understanding

17. Did you understand the Matching Mechanism?

Please choose only one of the following answers:

- Yes
- Rather yes
- Rather no
- No

Please write a comment about your decision:

---

## The Matching Mechanism

18. Which chairs did you name as 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> choice?

Please choose three answers.

Please write in every box your preference number, beginning with 1 to 33.

Please choose at the most three answers.

Please choose not more than three answers.

- Prof. Dr. Betz, Produktionsmanagement & Controlling (engl.: Product Management & Controlling)
- Prof. Dr. Beutner, Wirtschaftspädagogik (engl.: Economic Education)

- Dr. Ebert, BWL, insb. Externes Rechnungswesen, Lehrstuhlvertretung (engl.: Business Administration, esp. Financial Accounting)
- Prof. Dr. Eggert, BWL, insb. Marketing (engl.: Business Administration, esp. Marketing)
- Prof. Dr. Fahr, BWL, insb. Corporate Governance (engl.: Business Administration, esp. Corporate Governance)
- Prof. Dr. Feng, Ökonometrie und Quantitative Methoden (engl.: Econometrics and Quantitative Methods)
- Prof. Dr. Frick, Lehrstuhl für Organisations-, Medien-, Sportökonomie (engl.: Chair of Organizational Economics, Media Economics, Sport Economics)
- Jun.-Prof. Dr. Gerholz, WiPäd, insb. Hochschuldidaktik und Hochschulentwicklung (engl.: Economic Education, esp. University Didactic and University Development)
- Prof. Dr. Gilroy, Makrotheorie & Internationale Wirtschaftsbeziehungen (engl.: Macroeconomics & International Economics)
- Prof. Dr. Gries, Makrotheorie & Internationale Wachstums-Konjunkturtheorie (engl.: International Growth & Business Cycle Theory)
- Prof. Dr. Haake, VWL, insb. Mikrotheorie (engl.: Economics, esp. Microeconomics)
- Prof. Dr. Hehenkamp, Institutionenökonomik und Wirtschaftspolitik (engl.: Institutional Economics and Economic Policy)
- Jun.-Prof. Dr. Iseke, Organizational Behavior
- Prof. Dr. Jungblut, Volkswirtschaftslehre (engl.: Economics)
- Prof. Dr. Kabst, International Business
- Prof. Dr. Kimmelmann, Wirtschaftspädagogik, Lehrstuhlvertretung (engl.: Economic Education, Stand-in Professor)
- Prof. Dr. Kraft, Ökonometrie & Statistik (engl.: Econometrics & Statistics)
- Prof. Dr. Kremer, WiPäd, insb. Mediendidaktik & Weiterbildung (engl.: Economic Education, esp. Business and Human Resource Education)
- Prof. Dr. Jens Müller, BWL, insb. Unternehmensbesteuerung und Steuerlehre (engl.: Business Administration, Tax Accounting)
- Prof. Dr. Stefan Müller, Wirtschaftsrecht (engl.: Business Law)
- Prof. Dr. Dr. h.c. Dr. h.c. Rosenthal, Marketing
- Prof. Dr. Schaper, Lehrstuhl Arbeits- und Organisationspsychologie (engl.: Industrial Psychology, Organizational Psychology)
- Prof. Dr. Sievers, Internationale Rechnungslegung (engl.: International Accounting)
- Prof. Dr. Schiller, Finanzwirtschaft – Bankbetriebslehre (engl.: Business Finance – Banking Management)
- Prof. Dr. Sloane, Wirtschaftspädagogik (engl.: Economic Education)

- Prof. Dr. Schmitz, Statistik & Quantitative Methoden der Empirischen Wirtschaftsforschung (engl.: Statistics & Quantitative Methods of Empirical Economic Research)
- Prof. Dr. Schnedler, Managerial Economics
- Prof. Dr. Dr. G. Schneider, BWL, insb. Externes Rechnungswesen (engl.: Business Administration, esp. Financial Accounting)
- Prof. Dr. Schneider, Personalwirtschaft (engl.: Human Resource Management)
- Prof. Dr. Sureth, BWL, insb. Betriebswirtschaftliche Steuerlehre (engl.: Business Administration, esp. Business Taxation)
- Prof. Dr. Uhde, BWL, insb. Finanzierung & Investition (engl.: Business Administration, esp. Accounting & Finance)
- Prof. Dr. Werner, Internes & Externes Rechnungswesen (engl.: Financial & Managerial Accounting)
- Prof. Dr. Wunderlich, BWL, insb. Dienstleistungsmanagement (engl.: Business Administration, esp. Service Management)

19. How high did you estimate your chances to be accepted by your 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> choice BEFORE the allocation to a particular chair?

Please mark one answer for every choice:

	high	rather high	rather low	low	I don't know
1 <sup>st</sup> choice	<input type="checkbox"/>				
2 <sup>nd</sup> choice	<input type="checkbox"/>				
3 <sup>rd</sup> choice	<input type="checkbox"/>				

20. Are you satisfied with the chair allocated to you?

Please choose only one of the following answers:

- Very satisfied
- Satisfied
- Less satisfied
- Not satisfied

**More Details about the Choice**

21. Did you already take courses at your 1<sup>st</sup> choice?  
Please choose only one of the following answers:

- Yes, with very good results
- Yes, with good results
- Yes, with average results
- Yes, with below average results
- Yes, not (yet) finished
- No

22. Did you already take courses at your 2<sup>nd</sup> choice?  
Please choose only one of the following answers:

- Yes, with very good results
- Yes, with good results
- Yes, with average results
- Yes, with below average results
- Yes, not (yet) finished
- No

23. Did you already take courses at your 3<sup>rd</sup> choice?  
Please choose only one of the following answers:

- Yes, with very good results
- Yes, with good results
- Yes, with average results
- Yes, with below average results
- Yes, not (yet) finished
- No

## **Allocation**

24. Which chair were you allocated to?  
Please choose only one of the following answers:

- 1<sup>st</sup> choice
- 2<sup>nd</sup> choice

- 3<sup>rd</sup> choice

25. Did you write your thesis at this chair?

Please choose only one of the following answers:

- Yes
- No

### **Contact in Advance**

26. Did you contact the chairs before you choose them as your 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> choice?

Please choose all correct answers:

- Yes, the 1<sup>st</sup> choice
- Yes, the 2<sup>nd</sup> choice
- Yes, the 3<sup>rd</sup> choice

27. If you contacted them, did you receive a positive answer in advance?

Please choose only one of the following answers:

- Yes
- No

### **Satisfaction**

28. Are you satisfied with the Matching Mechanism in general?

Please choose only one of the following answers:

- Very satisfied
- Satisfied
- Less satisfied
- Not satisfied

### **Further Questions to the Choice**

29. Name five chairs which you think have the highest occupancy rates. Please choose five answers.

Please write in every box your preference number, beginning with 1 to 33.

Please choose at the most five answers.

Please choose not more than five answers.

- Prof. Dr. Betz, Produktionsmanagement & Controlling (engl.: Product Management & Controlling)
- Prof. Dr. Beutner, Wirtschaftspädagogik (engl.: Economic Education)
- Dr. Ebert, BWL, insb. Externes Rechnungswesen, Lehrstuhlvertretung (engl.: Business Administration, esp. Financial Accounting)
- Prof. Dr. Eggert, BWL, insb. Marketing (engl.: Business Administration, esp. Marketing)
- Prof. Dr. Fahr, BWL, insb. Corporate Governance (engl.: Business Administration, esp. Corporate Governance)
- Prof. Dr. Feng, Ökonometrie und Quantitative Methoden (engl.: Econometrics and Quantitative Methods)
- Prof. Dr. Frick, Lehrstuhl für Organisations-, Medien-, Sportökonomie (engl.: Chair of Organizational Economics, Media Economics, Sport Economics)
- Jun.-Prof. Dr. Gerholz, WiPäd, insb. Hochschuldidaktik und Hochschulentwicklung (engl.: Economic Education, esp. University Didactic and University Development)
- Prof. Dr. Gilroy, Makrotheorie & Internationale Wirtschaftsbeziehungen (engl.: Macroeconomics & International Economics)
- Prof. Dr. Gries, Makrotheorie & Internationale Wachstums-Konjunkturtheorie (engl.: International Growth & Business Cycle Theory)
- Prof. Dr. Haake, VWL, insb. Mikrotheorie (engl.: Economics, esp. Microeconomics)
- Prof. Dr. Hehenkamp, Institutionenökonomik und Wirtschaftspolitik (engl.: Institutional Economics and Economic Policy)
- Jun.-Prof. Dr. Iseke, Organizational Behavior
- Prof. Dr. Jungblut, Volkswirtschaftslehre (engl.: Economics)
- Prof. Dr. Kabst, International Business
- Prof. Dr. Kimmelmann, Wirtschaftspädagogik, Lehrstuhlvertretung (engl.: Economic Education, Stand-in Professor)
- Prof. Dr. Kraft, Ökonometrie & Statistik (engl.: Econometrics & Statistics)
- Prof. Dr. Kremer, WiPäd, insb. Mediendidaktik & Weiterbildung (engl.: Economic Education, esp. Business and Human Resource Education)
- Prof. Dr. Jens Müller, BWL, insb. Unternehmensbesteuerung und Steuerlehre (engl.: Business Administration, Tax Accounting)
- Prof. Dr. Stefan Müller, Wirtschaftsrecht (engl.: Business Law)

- Prof. Dr. Dr. h.c. Dr. h.c. Rosenthal, Marketing
- Prof. Dr. Schaper, Lehrstuhl Arbeits- und Organisationspsychologie (engl.: Industrial Psychology, Organizational Psychology)
- Prof. Dr. Sievers, Internationale Rechnungslegung (engl.: International Accounting)
- Prof. Dr. Schiller, Finanzwirtschaft – Bankbetriebslehre (engl.: Business Finance – Banking Management)
- Prof. Dr. Sloane, Wirtschaftspädagogik (engl.: Economic Education)
- Prof. Dr. Schmitz, Statistik & Quantitative Methoden der Empirischen Wirtschaftsforschung (engl.: Statistics & Quantitative Methods of Empirical Economic Research)
- Prof. Dr. Schnedler, Managerial Economics
- Prof. Dr. Dr. G. Schneider, BWL, insb. Externes Rechnungswesen (engl.: Business Administration, esp. Financial Accounting)
- Prof. Dr. Schneider, Personalwirtschaft (engl.: Human Resource Management)
- Prof. Dr. Sureth, BWL, insb. Betriebswirtschaftliche Steuerlehre (engl.: Business Administration, esp. Business Taxation)
- Prof. Dr. Uhde, BWL, insb. Finanzierung & Investition (engl.: Business Administration, esp. Accounting & Finance)
- Prof. Dr. Werner, Internes & Externes Rechnungswesen (engl.: Financial & Managerial Accounting)
- Prof. Dr. Wunderlich, BWL, insb. Dienstleistungsmanagement (engl.: Business Administration, esp. Service Management)

30. Name the five chairs where you would have liked it the most if you could have written your thesis there (this list may differ from the choices you took for the Matching Mechanism?)

Please choose five answers.

Please write in every box your preference number, beginning with 1 to 33.

Please choose at the most five answers.

Please choose not more than five answers.

- Prof. Dr. Betz, Produktionsmanagement & Controlling (engl.: Product Management & Controlling)
- Prof. Dr. Beutner, Wirtschaftspädagogik (engl.: Economic Education)
- Dr. Ebert, BWL, insb. Externes Rechnungswesen, Lehrstuhlvertretung (engl.: Business Administration, esp. Financial Accounting)
- Prof. Dr. Eggert, BWL, insb. Marketing (engl.: Business Administration, esp. Marketing)

- Prof. Dr. Fahr, BWL, insb. Corporate Governance (engl.: Business Administration, esp. Corporate Governance)
- Prof. Dr. Feng, Ökonometrie und Quantitative Methoden (engl.: Econometrics and Quantitative Methods)
- Prof. Dr. Frick, Lehrstuhl für Organisations-, Medien-, Sportökonomie (engl.: Chair of Organizational Economics, Media Economics, Sport Economics)
- Jun.-Prof. Dr. Gerholz, WiPäd, insb. Hochschuldidaktik und Hochschulentwicklung (engl.: Economic Education, esp. University Didactic and University Development)
- Prof. Dr. Gilroy, Makrotheorie & Internationale Wirtschaftsbeziehungen (engl.: Macroeconomics & International Economics)
- Prof. Dr. Gries, Makrotheorie & Internationale Wachstums-Konjunkturtheorie (engl.: International Growth & Business Cycle Theory)
- Prof. Dr. Haake, VWL, insb. Mikrotheorie (engl.: Economics, esp. Microeconomics)
- Prof. Dr. Hehenkamp, Institutionenökonomik und Wirtschaftspolitik (engl.: Institutional Economics and Economic Policy)
- Jun.-Prof. Dr. Iseke, Organizational Behavior
- Prof. Dr. Jungblut, Volkswirtschaftslehre (engl.: Economics)
- Prof. Dr. Kabst, International Business
- Prof. Dr. Kimmelman, Wirtschaftspädagogik, Lehrstuhlvertretung (engl.: Economic Education, Stand-in Professor)
- Prof. Dr. Kraft, Ökonometrie & Statistik (engl.: Econometrics & Statistics)
- Prof. Dr. Kremer, WiPäd, insb. Mediendidaktik & Weiterbildung (engl.: Economic Education, esp. Business and Human Resource Education)
- Prof. Dr. Jens Müller, BWL, insb. Unternehmensbesteuerung und Steuerlehre (engl.: Business Administration, Tax Accounting)
- Prof. Dr. Stefan Müller, Wirtschaftsrecht (engl.: Business Law)
- Prof. Dr. Dr. h.c. Dr. h.c. Rosenthal, Marketing
- Prof. Dr. Schaper, Lehrstuhl Arbeits- und Organisationspsychologie (engl.: Industrial Psychology, Organizational Psychology)
- Prof. Dr. Sievers, Internationale Rechnungslegung (engl.: International Accounting)
- Prof. Dr. Schiller, Finanzwirtschaft – Bankbetriebslehre (engl.: Business Finance – Banking Management)
- Prof. Dr. Sloane, Wirtschaftspädagogik (engl.: Economic Education)
- Prof. Dr. Schmitz, Statistik & Quantitative Methoden der Empirischen Wirtschaftsforschung (engl.: Statistics & Quantitative Methods of Empirical Economic Research)
- Prof. Dr. Schnedler, Managerial Economics

- Prof. Dr. Dr. G. Schneider, BWL, insb. Externes Rechnungswesen (engl.: Business Administration, esp. Financial Accounting)
- Prof. Dr. Schneider, Personalwirtschaft (engl.: Human Resource Management)
- Prof. Dr. Sureth, BWL, insb. Betriebswirtschaftliche Steuerlehre (engl.: Business Administration, esp. Business Taxation)
- Prof. Dr. Uhde, BWL, insb. Finanzierung & Investition (engl.: Business Administration, esp. Accounting & Finance)
- Prof. Dr. Werner, Internes & Externes Rechnungswesen (engl.: Financial & Managerial Accounting)
- Prof. Dr. Wunderlich, BWL, insb. Dienstleistungsmanagement (engl.: Business Administration, esp. Service Management)

31. How do you think your chances stand with these 5 chairs?

Please choose one answers for each chair:

	high	rather high	rather low	low	I don't know
1 <sup>st</sup> chair	<input type="checkbox"/>				
2 <sup>nd</sup> chair	<input type="checkbox"/>				
3 <sup>rd</sup> chair	<input type="checkbox"/>				
4 <sup>th</sup> chair	<input type="checkbox"/>				
5 <sup>th</sup> chair	<input type="checkbox"/>				

32. If this list differed from your choices in the Matching Mechanism: For what reasons?

Please choose all correct answers:

- To raise the chances to get any chair
- To raise the chances to get the 2<sup>nd</sup> choice
- To raise the chances to get the 3<sup>rd</sup> choice
- The "true" choice was pointless
- Preferences changed after the submission
- Chances for a better grade
- Other: \_\_\_\_\_

### More Details about the "true" Choice

33. Did you already take courses at your "true" 1<sup>st</sup> choice?

Please choose only one of the following answers:

- Yes, with very good results

- Yes, with good results
- Yes, with average results
- Yes, with below average results
- Yes, not (yet) finished
- No

34. Did you already take courses at your “true” 2<sup>nd</sup> choice?

Please choose only one of the following answers:

- Yes, with very good results
- Yes, with good results
- Yes, with average results
- Yes, with below average results
- Yes, not (yet) finished
- No

35. Did you already take courses at your “true” 3<sup>rd</sup> choice?

Please choose only one of the following answers:

- Yes, with very good results
- Yes, with good results
- Yes, with average results
- Yes, with below average results
- Yes, not (yet) finished
- No

36. Did you already take courses at your “true” 4<sup>th</sup> choice?

Please choose only one of the following answers:

- Yes, with very good results
- Yes, with good results
- Yes, with average results
- Yes, with below average results
- Yes, not (yet) finished
- No

37. Did you already take courses at your “true” 5<sup>th</sup> choice?

Please choose only one of the following answers:

- Yes, with very good results
- Yes, with good results
- Yes, with average results
- Yes, with below average results
- Yes, not (yet) finished
- No

## **Vetoliste**

38. Are there any chairs where you did not want to write your thesis because you did not visit any courses there?

Please choose only one of the following answers:

- Yes
- No

39. Were you allocated to one of these chairs?

Please choose only one of the following answers:

- Yes
- No

40. Please create a “Vetolist” and choose the chairs where you did not want to write your thesis due to subject-specific reasons.

Please choose between 1 and 15 answers.

Please write in every box your preference number, beginning with 1 to 33.

Please choose at least one answer.

Please choose not more than fifteen answers.

- Prof. Dr. Betz, Produktionsmanagement & Controlling (engl.: Product Management & Controlling)
- Prof. Dr. Beutner, Wirtschaftspädagogik (engl.: Economic Education)
- Dr. Ebert, BWL, insb. Externes Rechnungswesen, Lehrstuhlvertretung (engl.: Business Administration, esp. Financial Accounting)

- Prof. Dr. Eggert, BWL, insb. Marketing (engl.: Business Administration, esp. Marketing)
- Prof. Dr. Fahr, BWL, insb. Corporate Governance (engl.: Business Administration, esp. Corporate Governance)
- Prof. Dr. Feng, Ökonometrie und Quantitative Methoden (engl.: Econometrics and Quantitative Methods)
- Prof. Dr. Frick, Lehrstuhl für Organisations-, Medien-, Sportökonomie (engl.: Chair of Organizational Economics, Media Economics, Sport Economics)
- Jun.-Prof. Dr. Gerholz, WiPäd, insb. Hochschuldidaktik und Hochschulentwicklung (engl.: Economic Education, esp. University Didactic and University Development)
- Prof. Dr. Gilroy, Makrotheorie & Internationale Wirtschaftsbeziehungen (engl.: Macroeconomics & International Economics)
- Prof. Dr. Gries, Makrotheorie & Internationale Wachstums-Konjunkturtheorie (engl.: International Growth & Business Cycle Theory)
- Prof. Dr. Haake, VWL, insb. Mikrotheorie (engl.: Economics, esp. Microeconomics)
- Prof. Dr. Hehenkamp, Institutionenökonomik und Wirtschaftspolitik (engl.: Institutional Economics and Economic Policy)
- Jun.-Prof. Dr. Iseke, Organizational Behavior
- Prof. Dr. Jungblut, Volkswirtschaftslehre (engl.: Economics)
- Prof. Dr. Kabst, International Business
- Prof. Dr. Kimmelmann, Wirtschaftspädagogik, Lehrstuhlvertretung (engl.: Economic Education, Stand-in Professor)
- Prof. Dr. Kraft, Ökonometrie & Statistik (engl.: Econometrics & Statistics)
- Prof. Dr. Kremer, WiPäd, insb. Mediendidaktik & Weiterbildung (engl.: Economic Education, esp. Business and Human Resource Education)
- Prof. Dr. Jens Müller, BWL, insb. Unternehmensbesteuerung und Steuerlehre (engl.: Business Administration, Tax Accounting)
- Prof. Dr. Stefan Müller, Wirtschaftsrecht (engl.: Business Law)
- Prof. Dr. Dr. h.c. Dr. h.c. Rosenthal, Marketing
- Prof. Dr. Schaper, Lehrstuhl Arbeits- und Organisationspsychologie (engl.: Industrial Psychology, Organizational Psychology)
- Prof. Dr. Sievers, Internationale Rechnungslegung (engl.: International Accounting)
- Prof. Dr. Schiller, Finanzwirtschaft – Bankbetriebslehre (engl.: Business Finance – Banking Management)
- Prof. Dr. Sloane, Wirtschaftspädagogik (engl.: Economic Education)
- Prof. Dr. Schmitz, Statistik & Quantitative Methoden der Empirischen Wirtschaftsforschung (engl.: Statistics & Quantitative Methods of Empirical Economic Research)

- Prof. Dr. Schnedler, Managerial Economics
- Prof. Dr. Dr. G. Schneider, BWL, insb. Externes Rechnungswesen (engl.: Business Administration, esp. Financial Accounting)
- Prof. Dr. Schneider, Personalwirtschaft (engl.: Human Resource Management)
- Prof. Dr. Sureth, BWL, insb. Betriebswirtschaftliche Steuerlehre (engl.: Business Administration, esp. Business Taxation)
- Prof. Dr. Uhde, BWL, insb. Finanzierung & Investition (engl.: Business Administration, esp. Accounting & Finance)
- Prof. Dr. Werner, Internes & Externes Rechnungswesen (engl.: Financial & Managerial Accounting)
- Prof. Dr. Wunderlich, BWL, insb. Dienstleistungsmanagement (engl.: Business Administration, esp. Service Management)

## Comments

41. I would have wished for the following to happen regarding the Matching Mechanism:

Please write your answer:

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42. Do you have any further comments regarding to the Matching Mechanism:

Please write your answer:

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