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CLASS SIZE AND TEACHER EFFECTS IN HIGHER EDUCATION

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Class Size and Teacher Effects in Higher Education

Claudio Sapelli and Gastón Illanes

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Abstract

Using student evaluations as a learning measure, we estimate and compare class size and teacher effects for higher education, with emphasis on determining whether a comprehensive class size reduction policy that draws on the hiring of new teachers is likely to improve educational outcomes. We find that teacher effects far outweigh class size effects, and that young teachers and first time teachers perform significantly worse than their peers. Furthermore, we study whether teacher effects are correlated with observables, and find no significant variables beyond being a full time teacher. Overall, these findings suggest that at the higher education level the optimal strategy is to have large classrooms with highly qualified teachers.

Keywords: Class Size, Teacher Effects, Student Evaluations.

JEL Classification: I21, I23 and I28.

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1 Introduction

Several studies have estimated the effect of class size on learning outcomes, highlighting that smaller classes foster learning. However, when recommending smaller classes as a policy, it is often forgotten that those classes have to be staffed, and that the teachers hired to work in those classes may not necessarily be of the same quality. Thus, the effect of reducing class size will depend crucially on the balance between the positive effect of a smaller class and the potentially negative effect of the quality gap between infra-marginal and marginal teachers. This work gives insights for higher education by providing evidence on class size effects, teacher effects, age effects and first time teacher effects, using teacher evaluation surveys from the Economics Institute and the School of Administration at Pontificia Universidad Católica of Chile (FACEAPUC). Age effects and first time teacher effects are relevant for this discussion because the most likely avenues for an increase in the number of teachers are hiring first time teachers, and retaining older teachers for a longer period of time. Thus, marginal teachers are likely to lie at the tails of the age distribution, and are also more likely to have never taught before.

We prefer student evaluation data as an indicator of student learning because while student evaluations are not without their problems, they have distinct advantages over other output measures for evaluating teachers, such as test scores. In particular, Hanushek (2003) and Krueger (2003) argue that estimating the effect of class size on learning using test scores raises significant problems, since results are sensitive to the econometric specification used and to the outcome variable in question. Bedard and Kuhn (2008) build on this critique, arguing that test scores are sensitive to the type of test, to the abilities that it is designed to measure, and to the timing of the evaluation. Due to these problems, they argue that student evaluations are better indicators of student learning. Finally, there is substantial research linking student satisfaction to effective learning (Theall and Franklin (2001)), and research on student evaluations concludes that student ratings tend to be reliable, valid, unbiased, and useful (Murray (1994)).

We find that there is a negative effect of increasing class size by ten students of roughly

0.06 standard deviations. This is a relatively small effect compared to those found in the literature. We also find no evidence that older teachers suffer a dropoff in skill, but rather that teachers around 65 years old are very close to their peak. However, we find that younger teachers perform worse, with a 30 year old teacher performing 0.54 to 0.6 standard deviations worse than a 40 year old. If we interpret age as a proxy for experience[1], this suggests that reducing class size by hiring younger, more inexperienced teachers generates an overall negative effect on learning. Furthermore, we find that the impact of particularly talented teachers more than compensates for the impact of a large class. We are also able to place a lower bound on the first time teacher effect of roughly -0.3 standard deviations, and an upper bound of no effect. This result requieres further exploration before any significant conclusions can be garnered from it.

At the same time, we find a positive and significant correlation between grades and a teacher's evaluation, which could mean that students are "friendlier" towards more generous teachers, or that students who receive better grades have learned more, and thus reward the teacher with a better evaluation. More work is required in order to separate both effects, as this problem sheds doubt on the validity of using student evaluations as a way of measuring learning. Finally, we find a positive and significant effect of being a full time professor, a positive but not always significant effect of having a Ph.D. and zero effect of publications on measures of teacher quality. The paper proceeds as follows: Section 2 summarizes the relevant literature on the education production function and on student evaluations, Section 3 presents our data and explains the econometric methodology used, Section 4 presents our results, and Section 5 concludes.

2 Literature

Studies that estimate teachers' effects on achievement using longitudinal data, sucha as Rockoff (2004), have become the first step in solving many puzzles in the production function of achievement in education. Most authors have uncovered fairly large differences

[1]It is fairly standard to do so. Since age tends to overestimate experience, one can interpret these age effects as the lower bound of the experience effect.

in the effects of teachers who teach the same grade in the same school, use the same materials, and draw students fairly randomly from the same population. For instance, estimates often suggest that the best teacher may raise achievement by as much as half a standard deviation per year than the worst teacher who operates in identical circumstances. Once researchers have calculated teachers' empirical effects, these become a powerful dependent variable that can be used to explore the effects of policy on the teaching workforce. One use of the computed teachers' effects is to investigate whether they are closely related to the teacher credentials upon which achievement is traditionally regressed. The answer is generally no: credentials do not explain teacher effects for the most part, with the exception that very inexperienced teachers have worse effects, but even the effects of increased experience plateau after four to five years. The estimation of teacher effects and the subsequent finding that they are largely unrelated to credentials reconciles a good deal of other evidence and allows a relatively clear picture to emerge. This has led to a literature in which teacher effects and class size effects have to be measured and traded off one against the other. If we are to go by the "median" estimate in the literature then teacher effects are between two times and six times larger. Though results in the literature vary with methodology and data set (see Meghir and Rivkin (2010) for a thorough treatment), there is an emerging consensus regarding the great heterogeneity of teacher quality and its importance. It is in this area of the literature that we wish to contribute.

Numerous studies have attempted to quantify the effect of class size on educational attainment at the school level, using mostly test scores as the relevant outcome (e.g. Angrist and Lavy (1999)). Hanushek (2003) and Krueger (2003) argue that these results depend crucially on the econometric specification used and on the outcome variable studied. Therefore, a consensus estimate has yet to emerge at this level. This is also the case at the postsecondary level, as Bedard and Kuhn (2008) argue. Their discussion of the methodological benefits and drawbacks of using different outcome measures shines light on the fundamental reasons as to why this is the case. These authors argue that test score based performance measures are sensitive to both the type of test and to the abilities it measures. Therefore, different tests will generate different estimates of the class size effect. At the same time,

using course grades as an outcome measure also presents problems, since they are usually at the discretion of the teacher. Finally, Bedard and Kuhn (2008) argue that estimates based on test scores or grades may be sensitive to the timing of the evaluation, since it is not clear which tests or grades are relevant, those in the present course or those in future courses.

Based on these critiques, Bedard and Kuhn (2008) argue that student evaluations may be a better indicator of a teacher's performance than test scores or grades, since they do not suffer from the aforementioned problems. Furthermore, if students are viewed as customers who are purchasing a service from the university, it is in their best interests to criticize teachers who perform poorly, since doing so reduces the probability that they will encounter the same teacher in future courses, increases the probability that the teacher will improve his or her methodology, and increases the probability that the university will exert efforts to supervise teachers in a more efficient fashion. Also, as Bedard and Kuhn (2008) argue, if students are better evaluators of the labor market effect of learning than test scores, their evaluations are ultimately more relevant.

There has been much controversy and probably there will never be complete agreement regarding the effectiveness of using student ratings to evaluate effective teaching. However, if we accept the overall findings of the research that has been done, the evidence shows that there is value in using student ratings for teacher evaluation. Cashin (1999) performs a meta analysis of the research and concludes that "student ratings tend to be statistically reliable, valid and relatively free from bias or need for control; probably more so than other data used for evaluation". In spite of this, many myths (i.e. beliefs that have been disproved by research) exist about the usefulness of student ratings. Some common myths include: students are not able to make informed and consistent judgments about their instructors; student ratings are essentially a popularity contest; students cannot make accurate judgments unless they have been away from the course for a while; etc. Before proceeding, it is important to present some of the arguments that debunk these myths.

First, research indicates that students are the most qualified sources to report on the extent to which the learning experience was productive, informative, satisfying, or worthwhile. Thus, while student evaluations may not be direct measures of instructor or course

effectiveness, they are indicators of student satisfaction, and there is substantial research linking student satisfaction to effective teaching (Theall and Franklin (2001)). Also, there are consistently high correlations between student's ratings of the "amount learned" in the course and their overall ratings of the teacher and course (Marsh (1982), Gaubatz (2000)).

Also, research on student evaluations generally concludes that student ratings tend to be reliable, valid, unbiased and useful (Murray 1994). Murray argues that this conclusion stems from the fact that evaluations are consistent across raters, courses and time periods. Moreover, they correlate significantly with various objective indicators of student performance, such as performance on standardized tests. Felder and Brent (2004) argue that this is especially true if we group evaluations for different course offerings and different time periods for one professor.

Regarding the reliability of ratings, or their consistency among different raters and stability over time, research conclude that student ratings show an acceptable level of consistency (inter-rater reliability), given a class size of at least 15. The level of consistency among raters increases with class size. Student evaluations correlate moderately to highly with evaluations made of the same instructor by independent observers. Also, ratings show high levels of stability over time (for example as shown by alumni ratings). Finally, cross sectional studies show that student ratings reliably reflect instructor versus course effectiveness (Marsh and Roche (1997), Aleamoni (1999)). At the same time, regarding the validity of ratings, research shows that there are positive and significant correlations between student ratings and student learning; and between student ratings and observer, peer and alumni ratings (Greenwald (1997), McKeachie (1997)).

Finally, there is controversy regarding the correlation of student evaluations with factors such as class size and severity of grading. Researchers and critics of student evaluation have suggested numerous factors which may bias student ratings of teacher effectiveness, such as class size, grade leniency, instructor personality, gender, course workload, time that the class meets, and type of course (academic discipline, etc.). For each of these factors research has been somewhat inconclusive, with some studies asserting a positive, negative or null relationship between variables.

One issue we will focus on is the relationship between student evaluations and grades. Many researchers have focused on the positive relationship of grades and ratings a potential biasing factor, leading to grade inflation. The literature has no clear conclusion regarding the quantitative importance of this problem and whether it is necessary to control for grade leniency when comparing student evaluations of teachers (Marsh and Roche (1997), Greenwald and Gillmore (1997a), McKeachie (1997), Chambers and Shmitt (2002), Greenwald and Gillmore (1997b)). We find that there is a positive and significant correlation between grades and student evaluations. However, the causal interpretation of this finding is not immediate: on the one hand, it is possible that students reward teachers who are more lenient with a better evaluation, while on the other, students who learn more receive higher grades and also evaluate their professors better.

3 Data and Methodology

Course evaluation data comes from courses taught at FACEAPUC between the second semester of 1996 and the second semester of 2008. Overall, the dataset consists of 25 semesters, 276 courses, and 539 teachers, for a total of 3421 observations. FACEAPUC consists of two entities, the Economics Institute and the School of Administration, and our course data comes from the Commercial Engineering, Master of Economics, Master of Administrative Sciences, and PhD in Economics programs. Commercial Engineering is a professional degree that is a mixture of economics and administration [2], and most of our data comes from courses that are either core or elective courses for this program. However, some courses are electives for this program and required for the more advanced programs. Furthermore, some courses in our dataset are supervised by FACEAPUC but taught to students from other faculties. Overall, this suggests that there could be differences in the students that attend different courses, but there is no reason to believe that these differences should vary significantly over time. Therefore, course fixed effects should solve any problems that arise from this issue. Furthermore, students at FACEAPUC are relatively homogenous,

[2] Commercial Engineering students follow a curriculum that is equivalent to that of an Economics student in some countries and to that of a Business student in others.

Table 1: Percentage of Valid Responses

Year	Average	Minimum	Maximum	Year	Average	Minimum	Maximum
1996	85.7%	14.3%	100%	2003	72.3%	22.7%	95.0%
1997	79.6%	11.3%	100%	2004	73.6%	20.0%	100%
1998	79.3%	19.4%	100%	2005	77.2%	30.8%	100%
1999	75.0%	18.2%	100%	2006	71.8%	32.4%	98.3%
2000	70.3%	19.4%	100%	2007	59.7%	23.3%	85%
2001	61.3%	18.4%	98.1%	2008	71.4%	14.2%	100%
2002	68.7%	17.9%	100%				

as they are drawn from the right tail of the distribution of scores in the Chilean university admission test, and classes are physically very similar.

Student evaluations are performed twice a year, at the end of each semester, and consist of an online questionnaire containing a series of ordered response questions about different aspects of a course. Table 1 presents yearly averages for the percentage of students in a class who complete the evaluation. Although these percentages fluctuate between years, for every year in our sample more than half of all students have completed the evaluation. However, since evaluations are voluntary, classes with low response percentages may suffer from selection bias. In order to determine whether this affects the estimation of class size effects, results for regressions using all observations will be contrasted with results obtained using only courses where more than 75% of the enrolled students complete the evaluation.

The questionnaires' answers are processed and converted into five indexes, each ranging from 0 to 100[3], that correspond to each student's perception on the following topics: Course Aspects, Evaluation Aspects, Recommendation, Satisfaction, and Teacher's Work[4]. Our database contains class averages for these five indexes, as long as more than five students have answered the questionnaire. We believe that this restriction has no significant effect on courses that have more than 20 students, since normal response rates make it implausible that larger courses will have less than 5 responses, but it is possible that smaller courses will be underrepresented. Table 2 shows class means for all five indexes by class size. Interestingly, class means decrease slightly as class size rises, and the naive interpretation

[3]With 0 being the minimum score and 100 the maximum.

[4]Each index summarizes the answers to different questions about the course experience. Course Aspects pertains to logistical aspects of the course, Evaluation Aspects to the course's evaluations, Recommendation to whether the student would recommend the teacher, Satisfaction to whether the student is satisfied with the course, and Teacher's Work to the degree of work put in by the teacher during the course.

Table 2: Mean Student Evaluation, by Class Size

Class Size	Course Aspects	Evaluation Aspects	Recommendation	Satisfaction	Teacher's Work	Frequency
$<$ 20 Students	75.8	73.2	77.9	76.5	77.3	216
20 $\leq$ Students $<$ 40	74.1	72.4	76.6	75.7	76.0	780
40$\leq$ Students $<$ 50	73.2	71.8	73.6	73.0	75.2	510
50$\leq$ Students $<$ 60	73.3	71.5	75.4	74.3	75.2	651
60$\leq$ Students $<$ 70	72.7	71.8	75.9	74.9	74.9	766
70$\leq$ Students $<$ 80	72.8	72.7	77.2	75.4	75.6	355
80$\leq$ Students $<$ 90	70.6	70.4	74.3	71.1	74.1	115
Students $\geq$ 90	70.4	72.0	75.5	72.1	73.6	28

would be that class size may not have a strong negative impact on evaluations. However, we know these estimates to be biased, since better teachers are more likely to be assigned to larger classes. In fact, at FACEAPUC class size is determined mostly by the student's demand, since the administration only sets limits on the maximum number of students that are allowed to take a class[5]. Hence, we expect that estimates of the class size effect will be larger than the differences between these means.

An interesting advantage of our database is that the use of five different evaluation indexes allows us to study whether students' evaluations are sensitive to framing issues. If this is the case, then the question being asked may have a significant impact on the answers given and therefore on the effect of class size, age and of being a first time teacher on said answers. For example, if the evaluation is based on questions that focus on the amount of work the teacher has put in, it is possible that a positive class size effect may emerge even if learning is hindered by larger classes. Therefore, it seems prudent to explore whether different questions generate different estimates of the three effects in which we are interested.

Table 3 presents the correlations between the different indexes, showing that all five are positively correlated but that these correlations are not always high or stable. In fact, they range between 0.6452, the Course Aspects Index and Evaluation Aspects Index correlation, and 0.8978, the correlation between the Recommendation Index and the Satisfaction Index. This evidence supports the idea that the choice of question influences the evaluation result,

[5]Class size is determined after a two stage bidding process. In the first stage, the department opens classes and sets a maximum class size. Students have an endowment of points, which are spend bidding for different classes. If classes are full, the department can increase their size to accomodate demand, or open new course offerings. After this process, a second round of bidding is opened for unused slots, and once again classes may be expanded, although they almost never go beyond 80-85 students due to classroom constraints.

Table 3: Correlations Between the Five Evaluation Indexes

	Course Aspects	Evaluation Aspects	Recommendation	Satisfaction	Teacher's Work
Course Aspects	1.0000	0.6452	0.6597	0.6747	0.8010
Evaluation Aspects	0.6452	1.0000	0.7120	0.7227	0.7747
Recommendation	0.6597	0.7120	1.0000	0.8978	0.8455
Satisfaction	0.6747	0.7227	0.8978	1.0000	0.8084
Teacher's Work	0.8010	0.7747	0.8455	0.8084	1.0000

Table 4: Percentage of First Time Teachers

Year	Percentage of First Time Teachers	Year	Percentage of First Time Teachers
1996	27.3%	2003	8.9%
1997	20.8%	2004	10.4%
1998	15.2%	2005	7.9%
1999	14.0%	2006	10.2%
2000	13.8%	2007	7.9%
2001	9.1%	2008	9.8%
2002	16.1%		

and therefore may influence the class size effect estimates as well. Because of this, estimation using different indexes is warranted. Nevertheless, if one wanted to look at a single index to evaluate teachers, it would make sense to look at one based on questions about the teacher's work, as this index presents the highest correlations with the other four.

Data on date of birth was retrieved from FACEAPUC's archives for all individuals who appear more than once in the sample, since we will later argue that OLS estimates are biased and that fixed effects is an unbiased estimator. At the same time, data on teaching experience was built by looking at the first time a teacher appears in the sample. If he or she appears for the first time after 1999, we assume that it is their first time teaching, while if they appear before that date, we look at FACEAPUC's records for 1995 and 1996 to check whether they had taught before[6]. Table 4 summarizes the percentage of first time teachers for every year in the sample. We are wary of the fact that 1996 and 1997 show abnormally high numbers of first time teachers, so we will report first time teacher effects with and without these years.

[6]One could object that we are building a "First Time Teaching in FACEAPUC" variable, since we do not know whether they have taught elsewhere. However, we do not believe that this is a significant issue in our sample, as most first time teachers are very young.

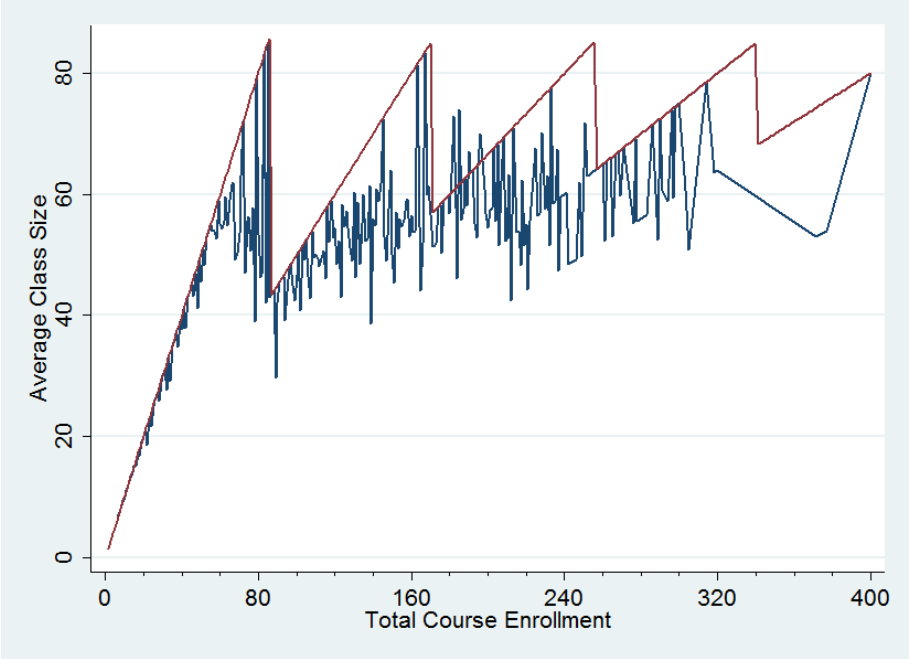
As has been previously mentioned, fixed effects estimation is required in order to obtain a consistent estimate of the class size effect and of the age effect. This is the case because there is an unobserved determinant of evaluation outcomes, teacher's ability, which is correlated with class size and with the likelihood of remaining in the sample as age increases. Therefore, OLS estimates will be biased downward in absolute value. To control for this, we assume that the teachers' ability is fixed over time, and estimate using teacher-course fixed effects. Therefore, our model is:

$$y_{citd} = X_{cit}\beta + \mu_{ci} + \epsilon_{citd} \tag{1}$$

where c indexes the course, i the professor, t the semester, and d the student evaluation index. Since there is no theoretical prediction regarding the function through which class size affects evaluations, we test different specifications, using various functions of the natural logarithm of class size inside X_{cit} as well as splines. Furthermore, X_{cit} also contains year and semester dummy variables in all specifications, as well as age and age squared when estimating the age effect. Finally, the left hand side y_{citd} vector corresponds to the average class evaluation for the index d. Since all regressors are averages, which are computed over different class sizes, it is clear that the error term is not homoskedastic. To solve this issue, one could multiply observations by the inverse of the square root of class size, or use a robust variance-covariance matrix estimator. We opt for the latter solution since heteroskedasticity due to factors other than the aggregation of individual outcomes with different group sizes may be present.

However, it is possible that these fixed effects estimates do not fully control for endogeneity in class size, since they only filter the effect of time invariant teacher and course characteristics. Thus, a potential concern is that at FACEAPUC student's demand partly determines class size, as classes are opened with a stated number of slots but actual class size depends on enrollment. In order to explore whether this affects our estimates, we use a Fuzzy Regression Discontinuity Design, as in Angrist and Lavy (1999), exploiting the fact that at FACEAPUC the maximum class size is roughly 85. Figure 1 plots the total number

Figure 1: Total Course Enrollment in a Semester and Average Class Size



of students who are enrolled in a course in a semester (adding over all classes) and the average class size. The line labelled "Rule" plots what average class size would be if FACEAPUC followed a version of Maimonedes' Rule with 85 students, while the "Observed" lines plots actual class sizes. It is clear that class sizes roughly follow this Maimonedes' Rule at the first discontinuity, and particularly that average class size drops from around 85 students to around 43 students when total course enrollment in a semester surpasses 85 students. Therefore, we see that there is a correlation between the class size suggested by a modified Maimonedes' Rule and actual class size, so we can instrument actual class size with a dummy identifing those courses with more than 85 total course enrollement. That is, we can estimate Equation 1, but instrumenting class size. Of course, this will estimate a LATE of increasing the class size using the information provide by the compliers affected by the instrument around the discontinuity.

As for the first time teacher effect estimates, using fixed effects drops all teachers who only taught once. It is reasonable to suspect that this group includes individuals who

revealed themselves to be very poor teachers and who were not rehired for later semesters. Thus, when estimating with fixed effects we are dropping from the sample the individuals with larger (more negative) first time teacher effects than those of individuals who continue teaching. Therefore, fixed effects estimates may be biased towards zero, serving as an upper bound of this effect. At the same time, OLS regressions are estimated by comparing the first teaching experience of all teachers with the later experiences of the better teachers, since we do not observe the trajectories of poor teachers who leave after their first experience. Thus, these estimates are downward biased, and serve as a lower bound of the first time teacher effect.

Since we are also interested in studying the correlation between teacher's ability and observables, we need an appropriate metric for the former variable. This can be obtained by estimating the following equation:

$$y_{citd} = X_{cit}\beta + \delta_c + \mu_i + \epsilon_{citd} \tag{2}$$

that is, using separate course and teacher effects. In this specification, the professor fixed effect μ_i should still control for the fact that better professors are assigned to larger classes, while the course fixed effect δ_c controls for time-invariant course characteristics. This second specification should lead to estimates with smaller standard errors than equation 1, since the former requires the same teacher to teach the same course twice to estimate a fixed effect while the latter requires a teacher to teach twice, regardless of the course, and for a course to be taught twice, regardless of the teacher. However, results from this second model could be biased, since it is possible that particular teachers are specially suited to certain courses, and that this specific ability is correlated with larger class sizes. Therefore, we must test use a Hausman test between both models before using the estimated fixed effects with confidence. This formal test is pending, but there appear to be no significant differences. Therefore, we have a strategy that controls for endogeneity bias, and also generates teacher effect estimates that can be regressed on teacher's characteristics, such as publications or educational background, in order to determine if teacher effects are correlated

with observables.

An interesting discussion regarding the use of student's evaluations to obtain estimates of a teacher's ability is whether a professor's grading leniency affects his or her evaluation. If it does, then it seems prudent to control for grades in equation 2. However, if classes that learn more receive better grades, and better professors make their students systematically learn more, controlling for grades leads to flawed teacher ability indicators. We present results on the impact of including grades as a control in equation 2, and the effect this has on estimated teacher ability. However, more work is needed in order to find an econometric strategy that controls for the effect of grading leniency on evaluations without biasing the teacher ability estimator.

Bypassing the aforementioned discussion, one can regress estimated teacher ability on a series of observables, in order to determine what variables are correlated with being a better teacher. In order to estimate this second stage regression, data on 368 professors was retrieved from FACEAPUC's archives[7], generating information about each teacher's educational background[8], part time or full time status, employment, and administrative dependence[9]. Table 5 presents summary statistics for this data. At the same time, information about research activity was gathered through RePEc, who ranks the Top 20 Authors in Chile using a composition of different indexes (Zimmermann (2009)), as well as making available information about paper citations, downloads and abstract views. Finally, because not all academic activity is recorded by RePec, we build an academic activity index which consists of the number of citations for each author's ten most cited works, according to Google Scholar. Table 6 presents summary statistics for this data.

As in all fixed effects models, in order to identify the estimated teacher effects when a constant is included as one of the regressors, one has to impose the restriction $N^{-1}\sum_{i=1}^{N}\mu_i = 0$. Therefore, the estimated teacher effects measure a teacher's differential impact on class evaluation with respect to the mean. Our second stage asks whether this impact is correlated

[7]The first stage regression generates 380 fixed effects, but there is missing data on 16 professors. These missing observations correspond only to part time teachers.

[8]Ph.D, Masters in Chile, Masters Abroad, MBA in Chile and MBA Abroad dummy variables were retrieved.

[9]Economics Institute or School of Administration.

Table 5: FACEAPUC's Professor Data

Variable	Mean - Full Sample	Mean - Business Professors	Mean - Economics Professors
Proportion of the Full Sample	-	57.1%	45.4%
Age	43.0	44.2	42.0
Ph.D. Dummy	19.5%	12.8%	28.0%
Master Abroad Dummy	25.8%	21.3%	32.0%
Master in Chile Dummy	26.9%	11.2%	44.0%
MBA Abroad Dummy	13.8%	22.3%	2.0%
MBA in Chile Dummy	4.3%	8.0%	0%
Full Time Professor Dummy	23.4%	21.6%	25.3%
Part Time Professor Dummy	76.6%	78.4%	74.7%
Business Experience Dummy	53.2%	70.8%	30.1%

Table 6: Research Activity Indicators

Variable	Mean - Full Sample	Mean - Business Professors	Mean - Economics Professors
Presence in RePEc Dummy	13.0%	5.1%	20.8%
RePEc Top 20 Authors in Chile Dummy	3.6%	0.5%	7.2%
RePEc Citations	7.1	.24	16.1
RePEc Downloads	205.7	6.5	440.7
RePEc Abstract Views	727.9	31.8	1558.4
Presence in Google Scholar	76.6%	79.1%	72.1%
Citations for Top 10 Works in Google Scholar	56.7	26.8	95.2

with a set of teacher's characteristics, such as age, educational background, and research experience. Because the dependent variable measures a teacher's differential impact with respect to the mean, rather than a teacher's actual impact, the control variables must be demeaned and the equation must be estimated without a constant in order to obtain consistent estimates. Because of this, the second step equation is:

$$\hat{\mu}_i = \tilde{Z}_i\gamma + \upsilon_i \tag{3}$$

where $\tilde{Z}_i$ represents deviations from the mean for the matrix of controls Z_i. The set of control variables used includes age, age squared, and a series of dummy variables for being a full time professor, being an economics professor, having a Ph.D., having a foreign masters degree, having a domestic masters degree, having a foreign MBA, and having a domestic MBA. Furthermore, it also includes information obtained through RePEc, such as a dummy for presence in RePEc and another for presence in the Top 20 Chileans in RePEc list, as well as the number of citations and of abstract views received, and the number of times a professor's work has been downloaded. Also, certain specifications use information garnered from Google Scholar, such as a dummy for presence in Google Scholar and the number of citations received by the professor's ten most cited works. Since the estimated fixed effect is

Table 7: Class Size Effect Estimates for the Teachers Work Index

VARIABLES	(1) OLS:linear	(2) FE: linear	(3) OLS: spline	(4) FE: spline
Between 20 and 40 Students			-1.321	-1.936**
			(0.960)	(0.773)
Between 40 and 50 Students			-1.801*	-2.826***
			(1.013)	(0.842)
Between 50 and 60 Students			-1.691*	-3.712***
			(0.971)	(0.850)
Between 60 and 70 Students			-2.284**	-4.604***
			(0.962)	(0.847)
Between 70 and 80 Students			-1.706*	-4.696***
			(1.024)	(0.919)
Between 80 and 90 Students			-3.372***	-6.547***
			(1.258)	(1.128)
Over 90 Students			-3.906*	-5.597***
			(2.053)	(1.747)
Class Size	-0.0277***	-0.0814***		
	(0.0104)	(0.0106)		
Constant	72.59***	76.81***	72.92***	76.05***
	(1.228)	(1.035)	(1.383)	(1.162)
Observations	3,421	3,421	3,421	3,421
R-squared	0.032	0.730	0.033	0.730

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

an average of several time periods, the second step regression requires an arbitrary definition for the relevant time period for publications. We only have publication data for October of 2009, so this is the information that we use. This problem is not relevant for the educational attainment variables or the administrative status variables, since they should remain mostly constant over time.

4 Results

4.1 Class Size Effect

Tables 7 to 11 show class size effect estimates obtained using the five previously mentioned evaluation indexes for four different specifications: linear OLS, OLS with a class size spline, linear fixed effects, and fixed effects with a class size spline.

Several interesting conclusions emerge from these results. First, as expected, OLS estimates are significantly attenuated in comparison to fixed effects estimates. This is consistent with the fact that class size at FACEAPUC is partially determined by student's demand, since the administration only sets a maximum size for each class. Therefore, we will not comment further on OLS results. Second, we find a negative and statistically significant

Table 8: Class Size Effect Estimates for the Evaluation Aspects Index

VARIABLES	(1) OLS:linear	(2) FE: linear	(3) OLS: spline	(4) FE: spline
Between 20 and 40 Students			-0.858	-2.734***
			(0.949)	(0.802)
Between 40 and 50 Students			-0.783	-3.268***
			(0.975)	(0.875)
Between 50 and 60 Students			-1.014	-4.077***
			(0.949)	(0.882)
Between 60 and 70 Students			-1.349	-5.161***
			(0.934)	(0.879)
Between 70 and 80 Students			-0.749	-4.898***
			(0.982)	(0.954)
Between 80 and 90 Students			-3.025**	-7.028***
			(1.195)	(1.171)
Over 90 Students			-1.565	-5.324***
			(1.703)	(1.814)
Class Size	-0.0155	-0.0730***		
	(0.00971)	(0.0111)		
Constant	65.06***	70.53***	65.27***	70.66***
	(1.085)	(1.078)	(1.263)	(1.207)
Observations	3,421	3,421	3,421	3,421
R-squared	0.124	0.671	0.126	0.673

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Class Size Effect Estimates for the Course Aspects Index

VARIABLES	(1) OLS:linear	(2) FE: linear	(3) OLS: spline	(4) FE: spline
Between 20 and 40 Students			-1.635*	-2.404***
			(0.967)	(0.765)
Between 40 and 50 Students			-2.767***	-3.220***
			(1.000)	(0.834)
Between 50 and 60 Students			-2.671***	-3.716***
			(0.963)	(0.841)
Between 60 and 70 Students			-2.993***	-4.586***
			(0.965)	(0.839)
Between 70 and 80 Students			-2.760***	-4.651***
			(1.022)	(0.910)
Between 80 and 90 Students			-5.077***	-5.539***
			(1.240)	(1.117)
Over 90 Students			-5.527***	-6.248***
			(2.071)	(1.730)
Class Size	-0.0458***	-0.0667***		
	(0.0101)	(0.0105)		
Constant	75.24***	79.13***	75.44***	79.25***
	(1.018)	(1.027)	(1.214)	(1.151)
Observations	3,421	3,421	3,421	3,421
R-squared	0.034	0.697	0.036	0.697

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Class Size Effect Estimates for the Recomendation Index

VARIABLES	(1) OLS:linear	(2) FE: linear	(3) OLS: spline	(4) FE: spline
Between 20 and 40 Students			-1.528	-1.958
			(1.738)	(1.505)
Between 40 and 50 Students			-3.884**	-3.634**
			(1.837)	(1.641)
Between 50 and 60 Students			-2.039	-4.773***
			(1.760)	(1.655)
Between 60 and 70 Students			-2.303	-6.095***
			(1.733)	(1.650)
Between 70 and 80 Students			-0.910	-6.119***
			(1.856)	(1.790)
Between 80 and 90 Students			-3.554	-8.504***
			(2.374)	(2.197)
Over 90 Students			-1.917	-7.998**
			(3.817)	(3.403)
Class Size	-0.0151	-0.117***		
	(0.0189)	(0.0207)		
Constant	65.03***	72.89***	66.46***	71.21***
	(2.382)	(2.017)	(2.650)	(2.264)
Observations	3,421	3,421	3,421	3,421
R-squared	0.045	0.695	0.047	0.694

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11: Class Size Effect Estimates for the Satisfaction Index

VARIABLES	(1) OLS:linear	(2) FE: linear	(3) OLS: spline	(4) FE: spline
Between 20 and 40 Students			-1.193	-3.616**
			(1.773)	(1.437)
Between 40 and 50 Students			-3.025	-5.661***
			(1.852)	(1.567)
Between 50 and 60 Students			-1.710	-6.550***
			(1.774)	(1.581)
Between 60 and 70 Students			-1.976	-7.890***
			(1.759)	(1.575)
Between 70 and 80 Students			-1.497	-7.974***
			(1.843)	(1.709)
Between 80 and 90 Students			-5.401**	-10.73***
			(2.246)	(2.098)
Over 90 Students			-4.227	-11.32***
			(3.459)	(3.250)
Class Size	-0.0308*	-0.134***		
	(0.0179)	(0.0198)		
Constant	65.96***	73.95***	66.34***	73.18***
	(2.137)	(1.926)	(2.488)	(2.162)
Observations	3,421	3,421	3,421	3,421
R-squared	0.065	0.674	0.066	0.673

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

linear effect of class size on evaluation outcomes, with coefficient estimates that imply that a one student rise in class size generates drops in evaluation outcomes ranging from 0.0667 to 0.134. This result is consistent with the spline regression results, which show that moving from less than 20 students to more than 90 students generates drops in evaluation outcomes ranging from 5.324 to 11.32. For such a large increase, it is surprising to find such a small drop in evaluation outcomes. In our opinion, this is highly suggestive evidence in favor of increasing class sizes in higher education.

It is also interesting to note that the five evaluation indexes generate class effect coefficients of different magnitudes. In fact, estimates generated by indexes that measure logistical aspects of the course (Course Aspects, Evaluation Aspects, and Teacher's Work) have significantly smaller (in absolute value) class size effect estimates than those of indexes that measure satisfaction with the course (Satisfaction and Recommendation). This is to be expected, since larger classes evidently require more logistical work, compensating some of the dissatisfaction due to a larger class size. This evidence highlights the fact that the choice of question is of importance, since the impact of class size on different dimensions of the educational production function varies. Furthermore, it casts doubt on the notion that students answer these questionnaires haphazardly, since it is difficult to reconcile the notion of students mindlessly filling out answers with these observed subtleties.

As was previously mentioned, we can also instrument class size with a dummy variable that identifies those course with total enrollement over 85 students. Table 12 presents the results from this exercise, with and without teacher fixed effects. Teacher fixed effects are relevant because some teachers influence the decision over class_size imposing more or less restrictions. These estimates can be interpreted as a LATE of increasing class size, so the Teacher's Work Index falls by roughly 0.04 when this takes place, while the Satisfaction Index falls by around 0.07. Interestingly, these estimates generate sistematically lower class size effects, sugesting that part of the effect that we observed in our previous estimates was related to the endogeneity if class size. Still, estimation for the class effect is similar for the recomendation index, which statistically is the more precise estimation of the class_size that we have, and the order of magnitudes between logistical aspects and satisfaction aspects is

Table 12: Fuzzy RD Estimates of the Class Size Effect

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	TW	TW	EA	EA	CA	CA	REC	REC	SAT	SAT
VARIABLES	RD	RD+FE	RD	RD+FE	RD	RD+FE	RD	RD+FE	RD	RD+FE
Class Size	-0.0721***	-0.0397*	0.0454*	-0.0215	0.0199	-0.0235	-0.162***	-0.109***	-0.0677	-0.0730*
	(0.0271)	(0.0217)	(0.0268)	(0.0226)	(0.0262)	(0.0220)	(0.0491)	(0.0422)	(0.0468)	(0.0407)
Constant	79.07***	84.68***	69.74***	76.24***	72.33***	80.51***	83.97***	92.29***	78.09***	85.65***
	(1.391)	(1.743)	(1.393)	(3.396)	(1.359)	(1.364)	(2.501)	(3.013)	(2.418)	(2.823)
Observations	3,421	3,421	3,421	3,421	3,421	3,421	3,421	3,421	3,421	3,421
R-squared	-0.003	0.610	-0.011	0.541	-0.007	0.554	-0.017	0.558	-0.000	0.525

Standard errors in parentheses

T statistic for predicted class size in the first stage of the RD specification is 55.85, and 19.96 in the RD+FE specification.

RD: Results obtained using Fuzzy Regression Discontinuity. RD+FE: Results obtained using Fuzzy RD and Teacher/Course Fixed Effects

TW: Teacher's Work Index; EA: Evaluation Aspects Index; CA: Course Aspects Index; REC: Recommendation Index; SAT: Satisfaction Index.

*** p<0.01, ** p<0.05, * p<0.1

the same.

However, it is possible that results are affected by response rates. To determine whether this is the case, Tables A.1 through A.3 in the Appendix study whether this is the case, comparing the results obtained by the original fixed effects regressions with the results obtained by dropping those observations that have a response rate above the mean minus one standard deviation, or 55.3%, and by dropping the observations with a response rate below 75% [10]. FS refers to the Full Sample results, while 1ST CS are the results from the first cut-off sample (over 55.3%) and 2ND CS are the results from the second cut-off sample (over 75%). As the criteria for being in the sample becomes stricter, we find that for both linear and spline specifications the class size effect estimates become larger, although the second cut off sample generates several non significant coefficients due to the loss of observations. We believe that these results highlight the notion that a potential pitfall of using student evaluation is that courses with low response rates may have evaluation indexes that misrepresent learning. Therefore, at first sight it would seem prudent to drop said courses before evaluating teachers using student evaluations. However, the economic interpretation of our results does not vary significantly, since the estimated coefficients continue to show a small class size effect [11]. Thus, we are comfortable using our main results rather than those obtained with the smaller samples.

[10] We also use larger group divisions for the spline regressions in order to gain more precision in the 75% and above response rate sample.

[11] For example, moving from less than 20 students to more than 80 students generates roughly a 16% drop in the Satisfaction Index.

Table 13: Age Effect Estimates for the Course Aspects and Evaluation Aspects Indexes

	Course Aspects Results				Evaluation Aspects Results			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	OLS: Linear	OLS: Spline	FE: Linear	FE: Spline	OLS: Linear	OLS: Spline	FE: Linear	FE: Spline
Between 20 and 40 Students		-2.007**		-2.051*		-1.022		-2.514**
		(1.008)		(1.059)		(1.001)		(1.067)
Between 40 and 50 Students		-2.877***		-2.911***		-0.560		-3.061***
		(1.037)		(1.102)		(1.024)		(1.127)
Between 50 and 60 Students		-3.055***		-3.304***		-1.042		-3.750***
		(1.001)		(1.108)		(0.999)		(1.112)
Between 60 and 70 Students		-3.703***		-4.237***		-1.763*		-4.845***
		(1.005)		(1.111)		(0.986)		(1.107)
Between 70 and 80 Students		-3.618***		-4.408***		-1.336		-4.702***
		(1.061)		(1.159)		(1.035)		(1.152)
Between 80 and 90 Students		-5.051***		-5.222***		-3.041**		-6.726***
		(1.264)		(1.291)		(1.250)		(1.343)
Over 90 Students		-5.876***		-6.017***		-1.199		-5.096***
		(2.179)		(1.553)		(1.797)		(1.490)
Age	-0.261**	-0.266**	0.896***	0.887***	-0.277***	-0.280***	1.608***	1.594***
	(0.110)	(0.111)	(0.284)	(0.284)	(0.100)	(0.101)	(0.285)	(0.284)
Age Squared	0.00153	0.00159	-0.0147***	-0.0146***	0.00196*	0.00199*	-0.0108***	-0.0106***
	(0.00127)	(0.00127)	(0.00302)	(0.00302)	(0.00113)	(0.00113)	(0.00293)	(0.00293)
Class Size	-0.0545***		-0.0664***		-0.0214**		-0.0710***	
	(0.0104)		(0.0115)		(0.0101)		(0.0114)	
Constant	84.84***	85.08***	66.60***	66.56***	74.11***	74.21***	28.72***	28.94***
	(2.538)	(2.678)	(6.762)	(6.794)	(2.390)	(2.528)	(6.964)	(7.009)
Observations	3174	3174	3174	3174	3174	3174	3174	3174
R^2	0.059	0.060	0.676	0.676	0.132	0.134	0.644	0.645

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.2 Age Effect

Tables 13 through 15 show our age effect estimates, which can also be interpreted as estimating the effect of experience on learning. For the Recommendation Index, age has a positive linear effect of 2.469 points [12] per year and a negative quadratic effect of 0.0194 point per year. As was previously mentioned, our sample is possibly biased towards higher abilities for both younger and older teachers. For younger teachers, this could be the case because they tend to be easier to fire and replace, meaning that only teachers with higher abilities remain in the sample. For older teachers, it is plausible that only those with high teaching skill are allowed to continue teaching. Thus, we expect OLS results to predict a flatter age-effect profile than FE results, which control for ability if we assume that it is constant in time. We find that this is in fact the case for the Recommendation and Satisfaction Indexes (Table 14), while the three remaining indexes generate similar results for the FE estimators but different OLS estimators.

We do not have an explanation for the divergent behavior of the estimates obtained using the Course Aspects Index. Since it is rather strange to find that it is the only index

[12] The scale of the evaluation index ranges from 0 to 100.

Table 14: Age Effect Estimates for the Satisfaction and Recommendation Indexes

	Recommendation Results				Satisfaction Results			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	OLS: Linear	OLS: Spline	FE: Linear	FE: Spline	OLS: Linear	OLS: Spline	FE: Linear	FE: Spline
Between 20 and 40 Students		-1.477		-1.662		-1.388		-3.302*
		(1.795)		(2.040)		(1.836)		(1.984)
Between 40 and 50 Students		-2.871		-3.385		-2.224		-5.323**
		(1.871)		(2.143)		(1.900)		(2.067)
Between 50 and 60 Students		-1.732		-4.409**		-1.595		-6.106***
		(1.814)		(2.160)		(1.833)		(2.080)
Between 60 and 70 Students		-2.385		-5.676***		-2.095		-7.415***
		(1.781)		(2.163)		(1.817)		(2.082)
Between 70 and 80 Students		-1.511		-6.028***		-2.184		-7.760***
		(1.909)		(2.239)		(1.909)		(2.157)
Between 80 and 90 Students		-2.550		-7.869***		-4.580**		-10.14***
		(2.399)		(2.564)		(2.297)		(2.540)
Over 90 Students		-2.055		-8.110***		-4.549		-11.53***
		(3.836)		(2.864)		(3.407)		(2.917)
Age	0.611***	0.598***	2.469***	2.460***	0.336*	0.335*	2.509***	2.484***
	(0.206)	(0.207)	(0.562)	(0.563)	(0.185)	(0.185)	(0.507)	(0.508)
Age Squared	-0.00763***	-0.00751***	-0.0194***	-0.0193***	-0.00436**	-0.00433**	-0.0194***	-0.0191***
	(0.00232)	(0.00233)	(0.00566)	(0.00566)	(0.00207)	(0.00207)	(0.00518)	(0.00518)
Class Size	-0.0185		-0.116***		-0.0323*		-0.132***	
	(0.0192)		(0.0233)		(0.0183)		(0.0219)	
Constant	57.56***	58.83***	13.31	11.56	63.01***	63.19***	12.56	12.01
	(5.098)	(5.344)	(14.13)	(14.29)	(4.517)	(4.780)	(12.79)	(12.96)
Observations	3174	3174	3174	3174	3174	3174	3174	3174
R^2	0.040	0.041	0.659	0.658	0.057	0.058	0.637	0.637

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 15: Age Effect Estimates for the Teacher's Work Index

	(1)	(2)	(3)	(4)
VARIABLES	OLS: Linear	OLS: Spline	FE: Linear	FE: Spline
Between 20 and 40 Students		-1.290		-1.608
		(0.993)		(0.986)
Between 40 and 50 Students		-1.236		-2.508**
		(1.036)		(1.051)
Between 50 and 60 Students		-1.475		-3.309***
		(1.000)		(1.053)
Between 60 and 70 Students		-2.298**		-4.182***
		(0.992)		(1.051)
Between 70 and 80 Students		-2.088**		-4.448***
		(1.059)		(1.095)
Between 80 and 90 Students		-3.007**		-6.088***
		(1.283)		(1.226)
Over 90 Students		-4.079*		-5.282***
		(2.182)		(1.558)
Age	0.148	0.149	1.372***	1.362***
	(0.114)	(0.115)	(0.284)	(0.284)
Age Squared	-0.00197	-0.00198	-0.0120***	-0.0118***
	(0.00129)	(0.00129)	(0.00291)	(0.00292)
Class Size	-0.0306***		-0.0796***	
	(0.0107)		(0.0115)	
Constant	71.99***	71.97***	44.95***	44.10***
	(2.727)	(2.845)	(6.890)	(6.971)
Observations	3174	3174	3174	3174
R^2	0.027	0.028	0.704	0.703

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

that behaves differently, we will not analyze its results further. The estimates for all other indexes suggest that teachers improve with age, reaching their peak around 60 years old. Therefore, we find no evidence suggesting that teachers' ability decreases with age. In fact, we find that it is younger teachers who perform consistently worse, with roughly 25% worse evaluations at age 27 than at age 60. Thus, if reducing class sizes is achieved by hiring a larger load of young teachers, we find that the benefit of a smaller class is more than offset by the cost of having a less experienced individual as a teacher. However, if it is achieved by keeping older teachers for a longer period of time, we find that there is no significant drop-off. In fact, this evidence suggests that retaining older teachers for a longer period of time is in fact desirable, since individuals are still near their peak at age 65 or 70.

However, since young individuals are more likely to be first time teachers, these results should be read with caution. It is possible that we are attributing poor teaching performance in younger teachers to age, when in fact it could be due to the effect of being a first time teacher, that is, we could be attributing to age the effect of experience. If this were true, our previous estimates would represent a lower bound of the age effect for young teachers. The following subsection delves into the estimation of first time teacher effects, in order to attempt to solve this question.

As in the previous section, it is possible that our results are biased due to low sample response rates. To test whether this is the case, Tables A.4 through A.7 in the Appendix repeat our previous regressions, but using two restricted samples: 1st CS, which uses only courses that have a response rate above the mean minus one standard deviation, or 55.3%, and 2nd CS, which only uses courses with a response rate above 75%. In general, we find that using these new samples does not change our previous results significantly, but does generate flatter age profiles.

4.3 First Time Teacher Effect

As for the impact of being a first time teacher on learning, Tables 16 to 18 offer an interesting first approximation. The first time teacher dummy coefficient is presented as a semi-elasticity, so the OLS estimates can be interpreted as predicting that first time

teachers have a negative impact ranging from 2% to 14,5%, depending on the evaluation index, while the fixed effects estimates predict that said impact is insignificant. Regarding the OLS estimates, it is interesting to note that the impact of experience is greater on those indexes that measure satisfaction with the course (Recommendation and Satisfaction) than on those measuring logistical aspects of the course. This can be interpreted as showing that the channel through which inexperience affects learning is not the logistics of the course, but rather something that is inherent to the classroom experience.

The disparity between OLS and FE estimates is interesing in itself. Since FE estimates includes only those teachers who were present more than once in the sample, this coefficient ignores all individuals who only taught once. If there is a significant correlation between not lasting for more than one semester as a teacher and being a poor first time teacher, as there should be, then FE estimates are biased upward and can be interpreted as the upper bound of the age effect. At the same time, since we do not observe the trajectory of the poor teachers that leave after one semester, OLS estimates are formed by comparing the first teaching experience of all teachers with the later experiences of the better teachers. Therefore, our OLS estimates are downward biased and can be interpreted as lower bounds. Thus, our results suggest that the impact of a first time teacher on learning ranges from 0 to a 14,5% drop.

As in the previous sections, it is possible that our results are biased due to the use of courses with low response rates. Tables A.8 through A.12 in the Appendix study this by repeating the previous regressions, but using two restricted samples: 1st CS, which uses only courses that have a response rate above the mean minus one standard deviation, or 55.3%, and 2nd CS, which only uses courses with a response rate above 75%. In this case, our OLS estimates drop for the Recommendation and Satisfaction Indexes, showing a larger first time teacher effect, while our FE estimates do not vary significantly.

At the same time, we have previously argued that it is possible that our first time effect estimates are affected by the abnormally large number of first time teachers in 1996 and 1997. Considering that data on teaching experience was built by looking at the first time a

Table 16: First Time Teacher Effect Estimates for the Course Aspects and Evaluation Aspects Indexes

	Course Aspects Results				Evaluation Aspects Results			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	OLS: Linear	OLS: Spline	FE: Linear	FE: Spline	OLS: Linear	OLS: Spline	FE: Linear	FE: Spline
Between 20 and 40 Students		-0.0135		-0.0276*		-0.00729		-0.0371**
		(0.0152)		(0.0166)		(0.0145)		(0.0167)
Between 40 and 50 Students		-0.0281*		-0.0381**		-0.00451		-0.0440**
		(0.0156)		(0.0172)		(0.0148)		(0.0175)
Between 50 and 60 Students		-0.0265*		-0.0455***		-0.00727		-0.0559***
		(0.0152)		(0.0174)		(0.0145)		(0.0173)
Between 60 and 70 Students		-0.0324**		-0.0590***		-0.0111		-0.0721***
		(0.0152)		(0.0174)		(0.0143)		(0.0172)
Between 70 and 80 Students		-0.0280*		-0.0598***		-0.00159		-0.0674***
		(0.0159)		(0.0180)		(0.0148)		(0.0178)
Between 80 and 90 Students		-0.0594***		-0.0721***		-0.0352*		-0.0989***
		(0.0190)		(0.0199)		(0.0181)		(0.0206)
Over 90 Students		-0.0713**		-0.0827***		-0.0135		-0.0747***
		(0.0318)		(0.0243)		(0.0252)		(0.0224)
Dummy for the First Time a Professor Teaches	-0.0387***	-0.0387***	-0.00971	-0.00930	-0.0209**	-0.0208**	-0.0100	-0.00935
	(0.00890)	(0.00890)	(0.00936)	(0.00941)	(0.00885)	(0.00886)	(0.00976)	(0.00977)
Class Size	-0.0219***		-0.0381***		-0.00418		-0.0441***	
	(0.00664)		(0.00851)		(0.00627)		(0.00846)	
Constant	4.376***	4.317***	4.474***	4.370***	4.171***	4.163***	4.366***	4.248***
	(0.0286)	(0.0184)	(0.0364)	(0.0216)	(0.0299)	(0.0203)	(0.0369)	(0.0232)
Observations	3421	3421	3421	3421	3421	3421	3421	3421
R^2	0.036	0.038	0.690	0.690	0.113	0.115	0.671	0.672

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 17: First Time Teacher Effect Estimates for the Satisfaction and Recommendation Indexes

	Recommendation Results				Satisfaction Results			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	OLS: Linear	OLS: Spline	FE: Linear	FE: Spline	OLS: Linear	OLS: Spline	FE: Linear	FE: Spline
Between 20 and 40 Students		-0.0200		-0.0236		0.0163		-0.0210
		(0.0291)		(0.0328)		(0.0328)		(0.0348)
Between 40 and 50 Students		-0.0696**		-0.0456		-0.0187		-0.0566
		(0.0321)		(0.0356)		(0.0352)		(0.0364)
Between 50 and 60 Students		-0.0301		-0.0701*		0.0192		-0.0661*
		(0.0297)		(0.0361)		(0.0326)		(0.0366)
Between 60 and 70 Students		-0.0381		-0.0881**		0.00460		-0.0867**
		(0.0294)		(0.0364)		(0.0329)		(0.0369)
Between 70 and 80 Students		-0.0124		-0.0941**		0.0207		-0.0907**
		(0.0310)		(0.0382)		(0.0336)		(0.0389)
Between 80 and 90 Students		-0.0523		-0.129***		-0.0339		-0.125***
		(0.0401)		(0.0429)		(0.0395)		(0.0443)
Over 90 Students		-0.0344		-0.117**		-0.0261		-0.147***
		(0.0630)		(0.0503)		(0.0598)		(0.0512)
Dummy for the First Time a Professor Teaches	-0.145***	-0.143***	-0.0317	-0.0310	-0.120***	-0.120***	-0.0170	-0.0160
	(0.0251)	(0.0250)	(0.0244)	(0.0245)	(0.0235)	(0.0235)	(0.0225)	(0.0226)
Class Size	-0.0155		-0.0759***		-0.00110		-0.0769***	
	(0.0133)		(0.0201)		(0.0139)		(0.0193)	
Constant	4.165***	4.139***	4.428***	4.195***	4.120***	4.109***	4.465***	4.227***
	(0.0660)	(0.0499)	(0.0894)	(0.0534)	(0.0658)	(0.0504)	(0.0845)	(0.0511)
Observations	3415	3415	3415	3415	3418	3418	3418	3418
R^2	0.054	0.056	0.716	0.716	0.068	0.070	0.701	0.701

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses

Table 18: First Time Teacher Effect Estimates for the Teacher's Work Index

VARIABLES	(1) OLS: Linear	(2) OLS: Spline	(3) FE: Linear	(4) FE: Spline
Between 20 and 40 Students		-0.0112		-0.0218
		(0.0143)		(0.0152)
Between 40 and 50 Students		-0.0195		-0.0338**
		(0.0151)		(0.0160)
Between 50 and 60 Students		-0.0169		-0.0475***
		(0.0145)		(0.0162)
Between 60 and 70 Students		-0.0257*		-0.0603***
		(0.0144)		(0.0161)
Between 70 and 80 Students		-0.0163		-0.0612***
		(0.0151)		(0.0167)
Between 80 and 90 Students		-0.0380**		-0.0861***
		(0.0183)		(0.0184)
Over 90 Students		-0.0514*		-0.0737***
		(0.0302)		(0.0237)
Dummy for the First Time a Professor Teaches	-0.0567***	-0.0567***	-0.00958	-0.00896
	(0.00986)	(0.00985)	(0.00964)	(0.00968)
Class Size	-0.0137**		-0.0470***	
	(0.00637)		(0.00843)	
Constant	4.316***	4.281***	4.459***	4.319***
	(0.0295)	(0.0206)	(0.0362)	(0.0210)
Observations	3421	3421	3421	3421
R^2	0.042	0.043	0.729	0.729

*** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses

teacher appears in the sample [13], a natural explanation for this large number is that we are mistakenly cataloguing experienced teachers as first time teachers for these years. If this were the case, our estimated first time effects would be upward biased, since we would be considering experienced teachers as first timers. Tables A.13 to A.17 in the Appendix show our results when dropping observations for these two years. We find no evidence supporting the notion that this problem is present; in fact, estimates of the first time effect become closer to zero when we drop 1996 and 1997.

There are two interesting extensions to this section that are currently pending. First, in order to obtain an unbiased estimate of the first time teacher effect, we need to estimate using FE while correcting for the selection bias in the FE sample using Heckit. Second, it could be possible that our finding that younger teachers have poorer performance could be due to the fact that they are inexperienced, rather than because they are simply young. To test this, we would need to incorporate age to the aforementioned Heckit estimation.

[13] If he or she appears for the first time after 1999, we assume that it is their first time teaching, while if they appear before that date, we look at FACEAPUC's records for 1995 and 1996 to check whether they had taught before.

4.4 Grade Effect

Adding grades to the linear fixed effects and the spline fixed effects estimations generates smaller class size effect estimates (in absolute value), as well as a positive grade effect. Theoretically, grades should be affected by learning, and since larger class sizes generate poorer evaluation outcomes, larger classes should be negatively correlated with grades. Table A.18 shows that this is in fact the case. Therefore, adding grades to our estimation controls for some of the impact of class size on learning, leading to smaller class size effect estimates. Clearly, this result is not desirable, so the relevant class size effect estimates continue to be those without controlling for grades.

However, it is possible that adding grades to our regressions filters the impact of giving systematically higher or lower grades on the estimated fixed effects (grading leniency effect), which is crucial if one wants to use them as performance measures, as we do. At the same time, it also possible that including grades also controls for teacher ability, as higher ability teachers make their classes learn more, and as a result get better grades (learning effect). Tables 19 and Figures A.1 to A.5 in Appendix D show that the changes in teacher's rankings[14] generated by including grades as a control variable are substantial. In fact, Table 19 shows that the standard deviation of changes in these rankings ranges between 20.3 to 47.7 places, that the largest rise in rankings ranges between 82 and 231 places, and that the largest drop ranges between 54 and 144 spots. At the same time, Figures A.1 to A.5 in Appendix D present histograms for these changes, showing that in general, most professors undergo small changes in their positions when including grades, but that there are significant tails of the rankings change distribution with large changes. These differences between rankings highlight that the decision to control for grades or not is not irrelevant, but more work is pending in order to separate the grading leniency effect and the learning effect.

[14] Rankings generated by sorting teachers by professor fixed effect. Rankings range from 1 to 402.

Table 19: Changes in Professor Rankings Generated by Including Grades as a Control

	Course Aspects	Evaluation Aspects	Recommendation	Satisfaction	Teacher's Work
SD of Change in Rankings	18.7	57.3	40.6	45.3	22.6
Largest Rise in Rankings	89	317	173	210	93
Largest Drop in Rankings	-73	-145	-106	-155	-75

4.5 Second Stage Regressions

Bypassing the issue of whether to control for grades or not, after obtaining teacher ability estimates, one can regress them on a series of observables and determine what factors are correlated with effective teaching. However, a separate problem with using professor fixed effects as an evaluation measure could arise if estimates using separate professor and course fixed effects fail to control for endogeneity bias. To test whether this is the case, Table A.18 contrasts results for the class size spline specification using professor-course fixed effects and separate professor and course fixed effects, showing that there are no significant differences between the estimated coefficients[15]. This evidence supports the notion that estimation using separate professor and course fixed effects controls for endogeneity bias while generating useful teacher effect estimates.

Assuming that teacher fixed effects that are estimated using grades and class size as a control variable are a valid performance measure, we can study what information is garnered from these fixed effects and what factors are correlated with a teacher's performance[16]. First, it is interesting to note that for every evaluation index, over a fifth of the teachers in our sample have a differential impact on evaluations that more than compensates increasing class size from less than 20 students to more than 90 students, as Table 20 shows. This supports the notion that a teacher's ability is a much more important component of the educational production function than class size, and suggests that increasing class sizes while actively seeking those teachers with exceptional ability is a good strategy.

What observable aspects are correlated with a teacher's fixed effect? Tables 21 through 25 explore this issue, regressing teacher fixed effects on age, age squared, a full time profesor dummy, and dummies for research experience and educational background. Interestingly, for all performance indexes, age has a negative effect for the relevant range of ages. This

[15] A formal test of this statement is pending

[16] A robustness check using fixed effects estimating without controlling for grades is pending.

Table 20: Comparison Between Teacher and Class Size Effects

	Course Aspects	Evaluation Aspects	Recommendation	Satisfaction	Teacher's Work
Effect of Raising Class Size From Less than 20 Students to More than 90	-6.25	-5.32	-8.00	-11.3	-5.60
% of Teachers whose Effect is Greater	23.1%	23.1%	28.5%	20.6%	24.8%

contradicts the results from the previous sections. More work is required in order to reconcile these results.

Meanwhile, the finding that full time professors have systematically higher teacher effects than part time professors should be interpreted with caution, because while it is possible that students value full time professors more because of their greater availability, it is also possible that teachers are chosen to become full time professors due to their greater ability. Therefore, there is no clear causal link between these two variables. However, it is clear that students prefer full time teachers, which again suggests that selecting better teachers and giving them larger classes is a sound strategy. The Economics professor dummy is significant and negative, which implies that teacher effects are systematically higher for Business professors. Perhaps the latter are more effective in conveying their material, o perhaps the material is easier to understand or more applied. Finally, our educational dummies and our research indicators are in general not significant, except for our PhD dummy for some specifications in the regressions for the Satisfaction and Evaluation Aspects indexes. Therefore, we find that, in general, observable educational characteristics are mostly irrelevant, and that research activity is independent of quality of teaching in our sample.

However, it is possible that Economics and Business have different production functions, so that our observables affect them differently. For example, having an MBA may be relevant for Business classes but not for Economics classes, or research activity may be more important to Economics students. To test whether this is the case, Tables A.19 through A.23 in the Appendix replicate the previous regressions for Business professors, while Tables A.24 through A.28 do so for Economics professors. For Business, we find mixed results. On the one hand, the PhD dummy becomes non significant, showing that having an advanced degree with a stronger emphasis in research does not lead to teaching a better business class,

Table 21: Determinants of Teacher Fixed Effects - Course Aspects Index

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Age	-1.746***	-1.807***	-1.824***	-1.833***	-1.783***	-1.888***
	(0.376)	(0.377)	(0.378)	(0.378)	(0.365)	(0.367)
Age Squared	0.0140***	0.0147***	0.0147***	0.0147***	0.0145***	0.0155***
	(0.00408)	(0.00411)	(0.00410)	(0.00410)	(0.00394)	(0.00396)
Full-Time Dummy	8.085***	8.316***	8.826***	8.728***	7.541***	7.329***
	(1.899)	(1.853)	(1.849)	(1.867)	(1.794)	(1.756)
Economics Dummy	-3.029**	-3.052**	-3.062**	-3.257***	-3.295***	-3.537***
	(1.247)	(1.270)	(1.236)	(1.182)	(1.165)	(1.175)
Ph.D Dummy	3.421**	2.675	2.625	2.849*	3.236*	1.597
	(1.661)	(1.631)	(1.641)	(1.632)	(1.694)	(1.696)
Foreign Masters Degree Dummy	0.511	0.795	0.837	0.794	0.599	0.704
	(1.569)	(1.530)	(1.560)	(1.545)	(1.610)	(1.572)
Domestic Masters Degree Dummy	1.108	1.308	0.759	0.934	1.115	0.561
	(1.158)	(1.190)	(1.110)	(1.072)	(1.159)	(1.147)
Foreign MBA Dummy	0.474	0.639	0.546	0.518	0.694	0.964
	(2.225)	(2.226)	(2.224)	(2.224)	(2.218)	(2.222)
Domestic MBA Dummy	-1.288	-1.162	-1.272	-1.303	-1.068	-0.956
	(2.411)	(2.413)	(2.418)	(2.425)	(2.412)	(2.411)
Business Experience Dummy	1.708	1.810	1.653	1.606	1.869	1.859
	(1.244)	(1.226)	(1.236)	(1.236)	(1.272)	(1.257)
Presence in Repec Dummy	-2.219	-4.412***	-3.862**	-3.284*		
	(1.746)	(1.593)	(1.687)	(1.770)		
Repec Citations			0.0245**	0.0871*		
			(0.0104)	(0.0462)		
Repec Downloads				-0.00408		
				(0.00385)		
Repec Abstract Views				0.000460		
				(0.000997)		
Top 20 Chileans in Repec Dummy		7.162**				
		(3.374)				
Presence in Google Scholar Dummy					-0.756	-1.211
					(1.274)	(1.276)
Number of Google Scholar Citations						0.00870***
						(0.00290)
Observations	349	348	348	348	349	349
R^2	0.215	0.224	0.231	0.236	0.212	0.232

*** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses

Table 22: Determinants of Teacher Fixed Effects - Evaluation Aspects Index

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Age	-1.454***	-1.439***	-1.437***	-1.435***	-1.459***	-1.471***
	(0.404)	(0.407)	(0.407)	(0.408)	(0.395)	(0.399)
Age Squared	0.0119***	0.0118***	0.0117***	0.0117***	0.0120***	0.0121***
	(0.00441)	(0.00445)	(0.00443)	(0.00444)	(0.00427)	(0.00432)
Full-Time Dummy	4.312**	4.168**	4.218**	4.213**	4.020**	3.997**
	(1.689)	(1.682)	(1.713)	(1.721)	(1.584)	(1.587)
Economics Dummy	-6.251***	-6.184***	-6.185***	-6.231***	-6.348***	-6.374***
	(1.234)	(1.238)	(1.235)	(1.238)	(1.197)	(1.209)
Ph.D Dummy	3.440**	3.074**	3.132**	3.197**	3.511***	3.332**
	(1.358)	(1.419)	(1.391)	(1.405)	(1.311)	(1.418)
Foreign Masters Degree Dummy	2.007	1.927	1.910	1.915	2.120	2.131
	(1.494)	(1.493)	(1.495)	(1.499)	(1.512)	(1.517)
Domestic Masters Degree Dummy	2.652**	2.522**	2.434**	2.484**	2.653**	2.593**
	(1.193)	(1.198)	(1.192)	(1.199)	(1.189)	(1.198)
Foreign MBA Dummy	2.112	2.138	2.112	2.105	2.227	2.257
	(1.952)	(1.956)	(1.953)	(1.959)	(1.929)	(1.936)
Domestic MBA Dummy	1.707	1.701	1.676	1.679	1.881	1.893
	(2.230)	(2.237)	(2.233)	(2.240)	(2.215)	(2.221)
Business Experience Dummy	0.142	-0.00764	-0.0352	-0.0557	0.466	0.465
	(1.142)	(1.135)	(1.140)	(1.144)	(1.168)	(1.170)
Presence in Repec Dummy	-1.150	-1.074	-0.825	-0.556		
	(1.387)	(1.447)	(1.390)	(1.488)		
Repec Citations			0.00324	0.0201		
			(0.00460)	(0.0273)		
Repec Downloads				-0.000322		
				(0.00251)		
Repec Abstract Views				-0.000116		
				(0.000672)		
Top 20 Chileans in Repec Dummy		1.541				
		(1.979)				
Presence in Google Scholar Dummy					-0.979	-1.029
					(1.341)	(1.352)
Number of Google Scholar Citations						0.000945
						(0.00185)
Observations	349	348	348	348	349	349
R^2	0.199	0.192	0.192	0.192	0.199	0.199

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses

Table 23: Determinants of Teacher Fixed Effects - Recommendation Index

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Age	-1.417**	-1.444**	-1.498**	-1.519**	-1.461**	-1.564**
	(0.631)	(0.636)	(0.636)	(0.637)	(0.630)	(0.637)
Age Squared	0.0101	0.0103	0.0107	0.0109	0.0108	0.0117*
	(0.00668)	(0.00673)	(0.00672)	(0.00672)	(0.00666)	(0.00674)
Full-Time Dummy	11.98***	12.13***	12.72***	12.50***	10.84***	10.63***
	(3.185)	(3.212)	(3.239)	(3.289)	(3.130)	(3.113)
Economics Dummy	-7.517***	-7.556***	-7.575***	-8.005***	-7.973***	-8.206***
	(2.514)	(2.529)	(2.509)	(2.370)	(2.422)	(2.418)
Ph.D Dummy	4.174	4.114	3.544	4.033	4.171	2.587
	(3.075)	(3.152)	(3.177)	(3.133)	(3.230)	(3.434)
Foreign Masters Degree Dummy	-0.540	-0.412	-0.194	-0.295	-0.206	-0.104
	(2.450)	(2.426)	(2.462)	(2.416)	(2.547)	(2.530)
Domestic Masters Degree Dummy	1.097	1.223	0.854	1.237	1.105	0.570
	(2.336)	(2.408)	(2.337)	(2.231)	(2.329)	(2.367)
Foreign MBA Dummy	-2.843	-2.803	-2.775	-2.837	-2.387	-2.126
	(3.812)	(3.814)	(3.816)	(3.812)	(3.809)	(3.825)
Domestic MBA Dummy	-3.681	-3.638	-3.654	-3.727	-3.090	-2.981
	(5.267)	(5.277)	(5.277)	(5.289)	(5.270)	(5.275)
Business Experience Dummy	2.900	3.004	2.917	2.820	3.781	3.771
	(2.276)	(2.278)	(2.288)	(2.284)	(2.574)	(2.576)
Presence in Repec Dummy	-4.581	-5.311*	-6.262**	-5.048		
	(2.939)	(3.066)	(3.097)	(3.123)		
Repec Citations			0.0219*	0.159		
			(0.0127)	(0.110)		
Repec Downloads				-0.00932		
				(0.00693)		
Repec Abstract Views				0.00112		
				(0.00147)		
Top 20 Chileans in Repec Dummy		1.525				
		(5.847)				
Presence in Google Scholar Dummy					-2.899	-3.339
					(2.568)	(2.589)
Number of Google Scholar Citations						0.00841*
						(0.00477)
Observations	349	348	348	348	349	349
R^2	0.118	0.119	0.123	0.131	0.117	0.123

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 24: Determinants of Teacher Fixed Effects - Satisfaction Index

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES						
Age	-1.690***	-1.727***	-1.784***	-1.808***	-1.724***	-1.834***
	(0.566)	(0.568)	(0.569)	(0.570)	(0.566)	(0.571)
Age Squared	0.0122**	0.0125**	0.0129**	0.0131**	0.0128**	0.0138**
	(0.00599)	(0.00601)	(0.00602)	(0.00602)	(0.00597)	(0.00604)
Full-Time Dummy	13.36***	13.56***	14.21***	13.98***	12.36***	12.14***
	(2.825)	(2.824)	(2.821)	(2.860)	(2.810)	(2.792)
Economics Dummy	-4.458**	-4.511**	-4.531**	-4.955***	-4.841**	-5.092***
	(2.063)	(2.081)	(2.056)	(1.905)	(1.959)	(1.959)
Ph.D Dummy	6.355**	6.246**	5.664**	6.139**	6.403**	4.695
	(2.763)	(2.782)	(2.817)	(2.767)	(2.815)	(2.929)
Foreign Masters Degree Dummy	-1.441	-1.260	-1.035	-1.145	-1.130	-1.021
	(2.463)	(2.446)	(2.472)	(2.435)	(2.550)	(2.529)
Domestic Masters Degree Dummy	2.658	2.833	2.401	2.774	2.664	2.087
	(2.012)	(2.074)	(1.990)	(1.885)	(2.005)	(2.028)
Foreign MBA Dummy	-0.823	-0.764	-0.746	-0.806	-0.427	-0.146
	(3.381)	(3.384)	(3.382)	(3.379)	(3.372)	(3.377)
Domestic MBA Dummy	-1.550	-1.488	-1.516	-1.594	-1.019	-0.902
	(5.418)	(5.428)	(5.428)	(5.443)	(5.430)	(5.423)
Business Experience Dummy	2.517	2.659	2.555	2.465	3.355	3.345
	(2.018)	(2.018)	(2.025)	(2.019)	(2.193)	(2.197)
Presence in Repec Dummy	-3.972	-5.025**	-5.929**	-4.824*		
	(2.624)	(2.539)	(2.650)	(2.627)		
Repec Citations			0.0247*	0.159*		
			(0.0143)	(0.0917)		
Repec Downloads				-0.00967		
				(0.00632)		
Repec Abstract Views				0.00127		
				(0.00147)		
Top 20 Chileans in Repec Dummy		2.299				
		(5.246)				
Presence in Google Scholar Dummy					-2.695	-3.170
					(2.218)	(2.234)
Number of Google Scholar Citations						0.00907**
						(0.00449)
Observations	349	348	348	348	349	349
R^2	0.161	0.162	0.168	0.177	0.160	0.168

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses

Table 25: Determinants of Teacher Fixed Effects - Teacher's Work Index

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Age	-1.058**	-1.111***	-1.139***	-1.153***	-1.038**	-1.112***
	(0.412)	(0.414)	(0.414)	(0.415)	(0.403)	(0.407)
Age Squared	0.00841*	0.00895**	0.00907**	0.00918**	0.00836*	0.00904**
	(0.00448)	(0.00450)	(0.00449)	(0.00450)	(0.00433)	(0.00438)
Full-Time Dummy	7.522***	7.763***	8.259***	8.138***	6.947***	6.798***
	(1.980)	(1.962)	(1.965)	(1.988)	(1.853)	(1.832)
Economics Dummy	-4.454***	-4.504***	-4.516***	-4.720***	-4.548***	-4.716***
	(1.502)	(1.522)	(1.496)	(1.437)	(1.438)	(1.453)
Ph.D Dummy	1.003	0.623	0.397	0.620	1.500	0.353
	(1.874)	(1.897)	(1.895)	(1.882)	(1.920)	(2.018)
Foreign Masters Degree Dummy	-0.0667	0.183	0.283	0.223	0.293	0.367
	(1.576)	(1.554)	(1.574)	(1.559)	(1.614)	(1.597)
Domestic Masters Degree Dummy	-0.764	-0.553	-0.992	-0.816	-0.769	-1.156
	(1.384)	(1.425)	(1.364)	(1.324)	(1.360)	(1.371)
Foreign MBA Dummy	0.557	0.668	0.625	0.596	0.777	0.966
	(2.145)	(2.144)	(2.145)	(2.144)	(2.137)	(2.140)
Domestic MBA Dummy	-1.723	-1.626	-1.695	-1.737	-1.262	-1.184
	(2.998)	(3.007)	(2.999)	(3.005)	(2.978)	(2.987)
Business Experience Dummy	0.584	0.732	0.613	0.574	1.724	1.717
	(1.382)	(1.372)	(1.380)	(1.378)	(1.530)	(1.528)
Presence in Repec Dummy	-2.178	-3.847**	-3.866**	-3.395*		
	(1.941)	(1.939)	(1.928)	(1.991)		
Repec Citations			0.0215**	0.0851		
			(0.00954)	(0.0611)		
Repec Downloads				-0.00495		
				(0.00380)		
Repec Abstract Views				0.000716		
				(0.000819)		
Top 20 Chileans in Repec Dummy		4.590				
		(3.563)				
Presence in Google Scholar Dummy					-3.137**	-3.456**
					(1.563)	(1.571)
Number of Google Scholar Citations						0.00609**
						(0.00286)
Observations	349	348	348	348	349	349
R^2	0.123	0.129	0.137	0.142	0.132	0.141

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

while on the other, in some specifications the number of times a paper has been cited has a significant positive effect. This could reflect that research activity is more important than an academic degree, or it could be due to the fact that very few business professors have papers that have been cited [17], so the coefficient is picking up some common characteristic between them. Also, it is interesting to note that our work and academic experience dummies are not significant. We believe that the evidence for Business professors supports the notion that ability is not highly correlated with observables.

As for the Economics professors, we find that age is no longer significant in some specifications, while a Domestic Masters Degree becomes positive and significant for some regressions. Also, our Google Scholar index becomes significant and positive, while the number of citations becomes significant and negative. Google Scholar controls for a wider scope of academic work than RePEc, by including books and articles, so we believe this shows that having academic activity in general is more important than the distance a teacher's research has from the state of the art in economics. These results clearly suggest that different departments have different production functions, and therefore that one selecting teachers by looking at observables, particular care should be taken to identify the variables that are correlated with ability for the specific department.

We believe that these results show that observable characteristics of a teacher, such as educational background or research activity, are not necessarily good indicators of teaching ability for all departments. Therefore, hiring policies that hinge on these observables are not guaranteed to conduce to better teaching. Instead, careful attention should be placed to identifying those who have higher teaching ability. Because of this, we believe that fixed effect estimation of the class size effect while controlling for grades, professor fixed effects and course fixed effects is a useful tool for policy makers in higher education.

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5 Conclusion

This work studies the tradeoff between smaller class sizes and teacher effects in the production function for higher education. While reducing class size has a positive effect, we argue that a comprehensive class size reduction policy has to be coupled with an expansion in the number of teachers. If this is the case, then the relative quality of marginal teachers is critical for the success of such a policy. In order to explore whether the quality gap between infra-marginal and marginal teachers dominates the class size effect, we estimate class size, teacher, age and first time teacher effects. Our findings show that while a negative class effect does exist, its' impact is offset by the negative impact of a very young teacher and by the impact of a first time teacher. Furthermore, we find no significant evidence suggesting that older teachers experience a dropoff in performance. Overall, this suggests that the dropoff in quality in inframarginal teachers dominates the beneficial effect of smaller classes.

Hanushek and Rivkin (2010) survey various studies and argue that the effect of a ten student reduction in class size is between 0.1 and 0.3 standard deviations of the dependent variable. In comparison, we predict, using the Recommendation and Satisfaction Indexes, that said impact is roughly 0.06 standard deviations [18], while the differential impact of a 40 year old teacher versus a 30 year old teacher is between 0.54 and 0.6 standard deviations, and the negative impact of a first time teacher is around 0.3 standard deviations. Thus, we find a relatively small class size effect, suggesting that it is optimal to increase class size and rely less on inexperienced, young teachers. At the same time, Rockoff (2004) finds that a one standard deviation increase in teacher quality raises learning outcomes in .24 standard deviations, while we find that a one standard deviation increase in teacher quality raises outcomes in roughly 1 standard deviation.

The previous conclusion places the onus on developing methods that identify observable characteristics that are correlated with being a better evaluated teacher. One such method is to regress the teacher fixed effects on controls such as age, educational background, research activity and work experience. We find that educational background, research activity and work experience controls are mostly insignificant, except for having a PhD and being a full

[18] Using the Recommendation and Satisfaction Indexes.

time professor. These results are in line with the idea that ability is mostly uncorrelated with observables.

The comparison between teachers of the School of Business and of the Institute of Economics shows that observables that may be relevant for some departments are not necessarily relevant for others. Intuitively, this is reasonable, since there is no reason why having a certain educational background or research experience should have the same impact for different departments, as their production function can differ.

Finally, we present two methodological contributions to this literature, by showing that student evaluation indexes that delve into different aspects of the educational production function generate different class size effect estimates, as well as different teacher fixed effects. Therefore, one must be particularly careful in determining what dimension of performance is relevant, as logistical dimensions tend to have smaller class size effect estimates than dimensions that are more correlated with satisfaction. Furthermore, the existence of different dimensions of performance suggests that different professor fixed effects should be compared in order to assess a teacher's performance. Second, we argue that although using estimated teacher fixed effects as a performance measure is a valid way to evaluate professors while controlling for class size, as Bedard and Kuhn (2008) argue, we show that the question of whether or not to control for grades is relevant and not yet solved.

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A Robustness Exercises for the Class Size Effect Estimates

This section compares the results obtained by the original regressions with results obtained by dropping those observations that have a response rate below the mean minus one standard deviation, or 55.3%, and by dropping the observations with a response rate below 75%. FS are the Full Sample results, 1ST CS are the results from the first cut-off sample (over 55.3%) and 2ND CS are the results from the second cut-off sample (over 75%).

Table A.1: Course Aspects

VARIABLES	(1) FE: Linear FS	(2) FE: Linear 1ST CS	(3) FE: Linear 2ND CS	(4) FE: Spline FS	(5) FE: Spline 1ST CS	(6) FE: Spline 2ND CS
Between 20 and 40 Students				-2.404**	-3.680***	-3.607
				(1.112)	(1.264)	(2.271)
Between 40 and 50 Students				-3.220***	-4.160***	-4.212*
				(1.154)	(1.325)	(2.394)
Between 50 and 60 Students				-3.716***	-4.566***	-4.228*
				(1.170)	(1.328)	(2.343)
Between 60 and 70 Students				-4.586***	-5.468***	-4.927**
				(1.172)	(1.320)	(2.366)
Between 70 and 80 Students				-4.651***	-5.540***	-5.514**
				(1.217)	(1.367)	(2.410)
Between 80 and 90 Students				-5.539***	-6.285***	-6.548**
				(1.347)	(1.491)	(2.575)
Over 90 Students				-6.248***	-7.039***	-8.374***
				(1.598)	(1.727)	(2.967)
Class Size	-0.0667***	-0.0645***	-0.0632***			
	(0.0118)	(0.0124)	(0.0176)			
Constant	79.13***	79.04***	79.40***	79.25***	80.15***	80.40***
	(1.139)	(1.206)	(1.559)	(1.463)	(1.649)	(2.787)
Observations	3,421	2,868	1,632	3,421	2,868	1,632
R-squared	0.697	0.723	0.781	0.697	0.724	0.781

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses

Table A.2: Evaluation Aspects

VARIABLES	(1) FE: Linear FS	(2) FE: Linear 1ST CS	(3) FE: Linear 2ND CS	(4) FE: Spline FS	(5) FE: Spline 1ST CS	(6) FE: Spline 2ND CS
Between 20 and 40 Students				-2.734**	-3.446***	-4.202
				(1.100)	(1.298)	(2.637)
Between 40 and 50 Students				-3.268***	-3.659***	-4.278
				(1.158)	(1.390)	(2.742)
Between 50 and 60 Students				-4.077***	-4.407***	-4.870*
				(1.146)	(1.355)	(2.662)
Between 60 and 70 Students				-5.161***	-5.621***	-5.879**
				(1.141)	(1.349)	(2.662)
Between 70 and 80 Students				-4.898***	-5.252***	-5.772**
				(1.185)	(1.392)	(2.715)
Between 80 and 90 Students				-7.028***	-7.429***	-8.557***
				(1.380)	(1.586)	(2.947)
Over 90 Students				-5.324***	-5.996***	-7.038**
				(1.507)	(1.677)	(3.301)
Class Size	-0.0730***	-0.0703***	-0.0697***			
	(0.0117)	(0.0126)	(0.0182)			
Constant	70.53***	70.54***	70.67***	70.66***	71.19***	71.85***
	(1.181)	(1.234)	(1.595)	(1.485)	(1.650)	(2.906)
Observations	3,421	2,868	1,632	3,421	2,868	1,632
R-squared	0.671	0.695	0.754	0.673	0.697	0.755

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses

Table A.3: Teacher's Work

VARIABLES	(1) FE: Linear FS	(2) FE: Linear 1ST CS	(3) FE: Linear 2ND CS	(4) FE: Spline FS	(5) FE: Spline 1ST CS	(6) FE: Spline 2ND CS
Between 20 and 40 Students				-1.936*	-2.727**	-2.539
				(1.030)	(1.292)	(2.220)
Between 40 and 50 Students				-2.826***	-3.179**	-3.043
				(1.095)	(1.378)	(2.310)
Between 50 and 60 Students				-3.712***	-3.800***	-3.458
				(1.103)	(1.369)	(2.266)
Between 60 and 70 Students				-4.604***	-4.973***	-4.467*
				(1.100)	(1.363)	(2.277)
Between 70 and 80 Students				-4.696***	-5.005***	-4.921**
				(1.143)	(1.409)	(2.351)
Between 80 and 90 Students				-6.547***	-7.100***	-7.067***
				(1.280)	(1.528)	(2.513)
Over 90 Students				-5.597***	-6.075***	-5.673*
				(1.597)	(1.809)	(3.180)
Class Size	-0.0814***	-0.0779***	-0.0772***			
	(0.0118)	(0.0127)	(0.0179)			
Constant	76.81***	76.47***	76.88***	76.05***	76.19***	76.36***
	(1.169)	(1.244)	(1.557)	(1.441)	(1.686)	(2.581)
Observations	3,421	2,868	1,632	3,421	2,868	1,632
R-squared	0.730	0.753	0.806	0.730	0.753	0.805

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses

B Robustness Exercises for the Age Effect Estimates

This section compares the results obtained by the original regressions with results obtained by dropping those observations that have a response rate below the mean minus one standard deviation, or 55.3%, and by dropping the observations with a response rate below 75%. FS are the Full Sample results, 1ST CS are the results from the first cut-off sample (over 55.3%) and 2ND CS are the results from the second cut-off sample (over 75%).

Table A.4: Course Aspects

VARIABLES	(1) FE: Linear FS	(2) FE: Linear 1ST CS	(3) FE: Linear 2ND CS	(4) FE: Spline FS	(5) FE: Spline 1ST CS	(6) FE: Spline 2ND CS
$20 \leq$ Students < 40				-2.048*	-3.569***	-3.254
				(1.058)	(1.226)	(2.209)
$40 \leq$ Students < 60				-3.098***	-4.250***	-3.988*
				(1.077)	(1.262)	(2.278)
$60 \leq$ Students < 80				-4.230***	-5.403***	-4.845**
				(1.100)	(1.274)	(2.299)
Over 80 Students				-5.301***	-6.322***	-6.412***
				(1.242)	(1.403)	(2.473)
Class Size	-0.0664***	-0.0661***	-0.0645***			
	(0.0115)	(0.0121)	(0.0173)			
Age	0.896***	0.807***	0.460	0.883***	0.796***	0.404
	(0.284)	(0.290)	(0.416)	(0.284)	(0.288)	(0.420)
Age Squared	-0.0147***	-0.0139***	-0.0100**	-0.0146***	-0.0138***	-0.00936**
	(0.00302)	(0.00311)	(0.00450)	(0.00301)	(0.00309)	(0.00454)
Constant	66.60***	68.69***	76.41***	66.64***	69.78***	78.12***
	(6.762)	(6.844)	(9.504)	(6.783)	(6.931)	(10.02)
Observations	3174	2653	1480	3174	2653	1480
R^2	0.676	0.700	0.756	0.676	0.701	0.755

*** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses

Table A.5: Evaluation Aspects

VARIABLES	(1) FE: Linear FS	(2) FE: Linear 1ST CS	(3) FE: Linear 2ND CS	(4) FE: Spline FS	(5) FE: Spline 1ST CS	(6) FE: Spline 2ND CS
Between 20 and 40 Students				-2.499**	-3.334***	-3.828
				(1.066)	(1.275)	(2.530)
Between 40 and 60 Students				-3.390***	-3.960***	-4.416*
				(1.087)	(1.317)	(2.559)
Between 60 and 80 Students				-4.704***	-5.364***	-5.530**
				(1.097)	(1.320)	(2.561)
Over 80 Students				-6.318***	-6.965***	-7.915***
				(1.271)	(1.479)	(2.786)
Class Size	-0.0710***	-0.0711***	-0.0709***			
	(0.0114)	(0.0123)	(0.0179)			
Age	1.608***	1.561***	1.616***	1.600***	1.566***	1.553***
	(0.285)	(0.302)	(0.452)	(0.284)	(0.301)	(0.449)
Age Squared	-0.0108***	-0.0106***	-0.0107**	-0.0106***	-0.0105***	-0.00983**
	(0.00293)	(0.00314)	(0.00487)	(0.00293)	(0.00312)	(0.00483)
Constant	28.72***	30.63***	29.65***	28.69***	30.79***	31.54***
	(6.964)	(7.293)	(10.29)	(6.983)	(7.329)	(10.38)
Observations	3174	2653	1480	3174	2653	1480
R^2	0.644	0.666	0.725	0.645	0.668	0.726

*** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses

Table A.6: Recommendation

VARIABLES	(1) FE: Linear FS	(2) FE: Linear 1ST CS	(3) FE: Linear 2ND CS	(4) FE: Spline FS	(5) FE: Spline 1ST CS	(6) FE: Spline 2ND CS
Between 20 and 40 Students				-1.649	-4.383*	-5.950
				(2.039)	(2.420)	(4.721)
Between 40 and 60 Students				-3.873*	-5.713**	-7.106
				(2.091)	(2.488)	(4.774)
Between 60 and 80 Students				-5.629***	-7.649***	-8.441*
				(2.136)	(2.517)	(4.805)
Over 80 Students				-7.728***	-9.796***	-12.31**
				(2.444)	(2.797)	(5.152)
Class Size	-0.116***	-0.112***	-0.106***			
	(0.0233)	(0.0247)	(0.0354)			
Age	2.469***	2.285***	2.214**	2.455***	2.279***	2.102**
	(0.562)	(0.607)	(0.948)	(0.562)	(0.606)	(0.941)
Age Squared	-0.0194***	-0.0180***	-0.0180*	-0.0192***	-0.0179***	-0.0166*
	(0.00566)	(0.00616)	(0.00999)	(0.00566)	(0.00612)	(0.00991)
Constant	13.31	18.93	22.76	11.58	19.00	26.32
	(14.13)	(15.02)	(21.75)	(14.28)	(15.20)	(21.66)
Observations	3174	2653	1480	3174	2653	1480
R^2	0.659	0.682	0.731	0.658	0.682	0.732

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses

Table A.7: Satisfaction

VARIABLES	(1) FE: Linear FS	(2) FE: Linear 1ST CS	(3) FE: Linear 2ND CS	(4) FE: Spline FS	(5) FE: Spline 1ST CS	(6) FE: Spline 2ND CS
Between 20 and 40 Students				-3.296*	-5.048**	-4.853
				(1.983)	(2.284)	(4.046)
Between 40 and 60 Students				-5.696***	-6.836***	-6.896*
				(2.018)	(2.368)	(4.011)
Between 60 and 80 Students				-7.402***	-8.387***	-8.178**
				(2.057)	(2.390)	(4.052)
Over 80 Students				-10.26***	-11.65***	-12.17***
				(2.411)	(2.717)	(4.543)
Class Size	-0.132***	-0.121***	-0.125***			
	(0.0219)	(0.0232)	(0.0331)			
Age	2.509***	2.270***	1.687**	2.476***	2.252***	1.578**
	(0.507)	(0.533)	(0.785)	(0.507)	(0.533)	(0.782)
Age Squared	-0.0194***	-0.0167***	-0.0101	-0.0191***	-0.0164***	-0.00881
	(0.00518)	(0.00545)	(0.00836)	(0.00517)	(0.00544)	(0.00835)
Constant	12.56	17.81	31.17*	12.16	18.52	33.58*
	(12.79)	(13.32)	(18.31)	(12.93)	(13.58)	(18.64)
Observations	3174	2653	1480	3174	2653	1480
R^2	0.637	0.658	0.718	0.636	0.659	0.717

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

C Robustness Exercises for the First Time Teacher Effect Estimates

C.1 Dropping Observations with Low Response Rates

This section compares the results obtained by the original regressions with results obtained by dropping those observations that have a response rate below the mean minus one standard deviation, or 55.3%, and by dropping the observations with a response rate below 75%. FS are the Full Sample results, 1ST CS are the results from the first cut-off sample (over 55.3%) and 2ND CS are the results from the second cut-off sample (over 75%).

Table A.8: Course Aspects

VARIABLES	(1) OLS: Linear FS	(2) OLS: Linear 1ST CS	(3) OLS: Linear 2ND CS	(4) OLS: Spline FS	(5) OLS: Spline 1ST CS	(6) OLS: Spline 2ND CS	(7) FE: Linear FS	(8) FE: Linear 1ST CS	(9) FE: Linear 2ND CS	(10) FE: Spline FS	(11) FE: Spline 1ST CS	(12) FE: Spline 2ND CS
Between 20 and 40 Students				-0.0135	-0.0108	-0.0156				-0.0275*	-0.0461**	-0.0563
				(0.0152)	(0.0195)	(0.0287)				(0.0166)	(0.0194)	(0.0350)
Between 40 and 60 Students				-0.0272*	-0.0250	-0.0198				-0.0417**	-0.0556***	-0.0648*
				(0.0148)	(0.0191)	(0.0276)				(0.0169)	(0.0198)	(0.0360)
Between 60 and 80 Students				-0.0310**	-0.0263	-0.0182				-0.0582***	-0.0719***	-0.0778**
				(0.0149)	(0.0192)	(0.0275)				(0.0172)	(0.0200)	(0.0363)
Over 80 Students				-0.0617***	-0.0597***	-0.0726**				-0.0730***	-0.0854***	-0.103***
				(0.0183)	(0.0223)	(0.0309)				(0.0192)	(0.0218)	(0.0387)
Dummy for the First Time a Professor Teaches	-0.0387***	-0.0361***	-0.0438***	-0.0387***	-0.0360***	-0.0433***	-0.00971	-0.00554	-0.0134	-0.00916	-0.00495	-0.0112
	(0.00890)	(0.00921)	(0.0114)	(0.00891)	(0.00924)	(0.0115)	(0.00936)	(0.0104)	(0.0140)	(0.00940)	(0.0104)	(0.0143)
Class Size	-0.0219***	-0.0212***	-0.0162*				-0.0381***	-0.0422***	-0.0459***			
	(0.00664)	(0.00770)	(0.00966)				(0.00851)	(0.00931)	(0.0131)			
Constant	4.376***	4.372***	4.356***	4.317***	4.313***	4.312***	4.474***	4.488***	4.513***	4.369***	4.381***	4.398***
	(0.0286)	(0.0324)	(0.0409)	(0.0184)	(0.0215)	(0.0290)	(0.0364)	(0.0403)	(0.0566)	(0.0215)	(0.0246)	(0.0417)
Observations	3421	2868	1632	3421	2868	1632	3421	2868	1632	3421	2868	1632
R^2	0.036	0.036	0.051	0.038	0.038	0.057	0.690	0.718	0.782	0.690	0.718	0.781

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses

Table A.9: Evaluation Aspects

VARIABLES	(1) OLS: Linear FS	(2) OLS: Linear 1ST CS	(3) OLS: Linear 2ND CS	(4) OLS: Spline FS	(5) OLS: Spline 1ST CS	(6) OLS: Spline 2ND CS	(7) FE: Linear FS	(8) FE: Linear 1ST CS	(9) FE: Linear 2ND CS	(10) FE: Spline FS	(11) FE: Spline 1ST CS	(12) FE: Spline 2ND CS
Between 20 and 40 Students				-0.00725	-0.000532	-0.0197				-0.0369**	-0.0491**	-0.0636
				(0.0145)	(0.0176)	(0.0272)				(0.0167)	(0.0195)	(0.0411)
Between 40 and 60 Students				-0.00596	-0.00127	-0.0155				-0.0497***	-0.0562***	-0.0693*
				(0.0140)	(0.0170)	(0.0261)				(0.0169)	(0.0202)	(0.0415)
Between 60 and 80 Students				-0.00804	-0.00190	-0.0156				-0.0690***	-0.0768***	-0.0882**
				(0.0139)	(0.0169)	(0.0260)				(0.0170)	(0.0203)	(0.0417)
Over 80 Students				-0.0310*	-0.0238	-0.0564*				-0.0927***	-0.100***	-0.125***
				(0.0171)	(0.0197)	(0.0291)				(0.0195)	(0.0225)	(0.0450)
Dummy for the First Time a Professor Teaches	-0.0209**	-0.0178*	-0.0304***	-0.0210**	-0.0179*	-0.0300***	-0.0100	-0.00379	-0.0152	-0.00918	-0.00312	-0.0129
	(0.00885)	(0.00921)	(0.0108)	(0.00887)	(0.00923)	(0.0109)	(0.00976)	(0.0108)	(0.0156)	(0.00976)	(0.0108)	(0.0156)
Class Size	-0.00418	-0.00382	-0.00820				-0.0441***	-0.0456***	-0.0508***			
	(0.00627)	(0.00698)	(0.0101)				(0.00846)	(0.00933)	(0.0135)			
Constant	4.171***	4.171***	4.187***	4.163***	4.158***	4.172***	4.366***	4.373***	4.401***	4.247***	4.255***	4.274***
	(0.0299)	(0.0318)	(0.0440)	(0.0203)	(0.0219)	(0.0293)	(0.0369)	(0.0405)	(0.0583)	(0.0231)	(0.0254)	(0.0457)
Observations	3421	2868	1632	3421	2868	1632	3421	2868	1632	3421	2868	1632
R^2	0.113	0.130	0.153	0.114	0.131	0.157	0.671	0.698	0.757	0.671	0.698	0.758

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A.10: Recommendation

VARIABLES	(1) OLS: Linear FS	(2) OLS: Linear 1ST CS	(3) OLS: Linear 2ND CS	(4) OLS: Spline FS	(5) OLS: Spline 1ST CS	(6) OLS: Spline 2ND CS	(7) FE: Linear FS	(8) FE: Linear 1ST CS	(9) FE: Linear 2ND CS	(10) FE: Spline FS	(11) FE: Spline 1ST CS	(12) FE: Spline 2ND CS
Between 20 and 40 Students				-0.0199	-0.0131	0.00300				-0.0233	-0.0541	-0.0835
				(0.0290)	(0.0373)	(0.0642)				(0.0328)	(0.0441)	(0.107)
Between 40 and 60 Students				-0.0473*	-0.0351	-0.00710				-0.0573*	-0.0743	-0.107
				(0.0284)	(0.0363)	(0.0623)				(0.0346)	(0.0453)	(0.107)
Between 60 and 80 Students				-0.0298	-0.0125	0.0143				-0.0862**	-0.107**	-0.136
				(0.0281)	(0.0361)	(0.0619)				(0.0359)	(0.0461)	(0.108)
Over 80 Students				-0.0489	-0.0390	-0.0416				-0.122***	-0.145***	-0.196*
				(0.0374)	(0.0443)	(0.0708)				(0.0407)	(0.0506)	(0.113)
Dummy for the First Time a Professor Teaches	-0.145***	-0.149***	-0.194***	-0.144***	-0.148***	-0.194***	-0.0317	-0.0338	-0.0953**	-0.0304	-0.0323	-0.0913**
	(0.0251)	(0.0274)	(0.0362)	(0.0251)	(0.0275)	(0.0363)	(0.0244)	(0.0274)	(0.0414)	(0.0245)	(0.0276)	(0.0416)
Class Size	-0.0155	-0.00232	0.0107				-0.0759***	-0.0806***	-0.0971***			
	(0.0133)	(0.0159)	(0.0244)				(0.0201)	(0.0235)	(0.0331)			
Constant	4.165***	4.107***	4.054***	4.140***	4.122***	4.096***	4.428***	4.446***	4.557***	4.192***	4.211***	4.286***
	(0.0660)	(0.0742)	(0.104)	(0.0500)	(0.0548)	(0.0756)	(0.0894)	(0.103)	(0.140)	(0.0530)	(0.0619)	(0.117)
Observations	3415	2867	1632	3415	2867	1632	3415	2867	1632	3415	2867	1632
R^2	0.054	0.060	0.076	0.055	0.061	0.077	0.716	0.734	0.801	0.715	0.734	0.800

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A.11: Satisfaction

VARIABLES	(1) OLS: Linear FS	(2) OLS: Linear 1ST CS	(3) OLS: Linear 2ND CS	(4) OLS: Spline FS	(5) OLS: Spline 1ST CS	(6) OLS: Spline 2ND CS	(7) FE: Linear FS	(8) FE: Linear 1ST CS	(9) FE: Linear 2ND CS	(10) FE: Spline FS	(11) FE: Spline 1ST CS	(12) FE: Spline 2ND CS
Between 20 and 40 Students				0.0164	0.0261	0.0467				-0.0209	-0.0549	-0.0811
				(0.0328)	(0.0409)	(0.0701)				(0.0347)	(0.0387)	(0.0800)
Between 40 and 60 Students				0.00260	0.00891	0.0442				-0.0611*	-0.0858**	-0.120
				(0.0320)	(0.0402)	(0.0679)				(0.0355)	(0.0402)	(0.0800)
Between 60 and 80 Students				0.00978	0.0235	0.0576				-0.0865**	-0.110***	-0.147*
				(0.0319)	(0.0401)	(0.0675)				(0.0366)	(0.0409)	(0.0818)
Over 80 Students				-0.0324	-0.0322	-0.0129				-0.128***	-0.160***	-0.202**
				(0.0379)	(0.0453)	(0.0732)				(0.0420)	(0.0465)	(0.0894)
Dummy for the First Time a Professor Teaches	-0.120***	-0.128***	-0.175***	-0.121***	-0.129***	-0.176***	-0.0170	-0.0192	-0.0598	-0.0158	-0.0178	-0.0553
	(0.0235)	(0.0251)	(0.0337)	(0.0236)	(0.0252)	(0.0340)	(0.0225)	(0.0249)	(0.0380)	(0.0225)	(0.0250)	(0.0385)
Class Size	-0.00110	0.00143	0.0140				-0.0769***	-0.0815***	-0.116***			
	(0.0139)	(0.0156)	(0.0233)				(0.0193)	(0.0210)	(0.0314)			
Constant	4.120***	4.104***	4.054***	4.110***	4.096***	4.063***	4.465***	4.480***	4.635***	4.226***	4.247***	4.300***
	(0.0658)	(0.0706)	(0.0963)	(0.0505)	(0.0552)	(0.0766)	(0.0845)	(0.0904)	(0.131)	(0.0508)	(0.0540)	(0.0920)
Observations	3418	2867	1632	3418	2867	1632	3418	2867	1632	3418	2867	1632
R^2	0.068	0.085	0.103	0.069	0.086	0.105	0.701	0.733	0.792	0.701	0.733	0.791

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A.12: Teacher's Work

VARIABLES	(1) OLS: Linear FS	(2) OLS: Linear 1ST CS	(3) OLS: Linear 2ND CS	(4) OLS: Spline FS	(5) OLS: Spline 1ST CS	(6) OLS: Spline 2ND CS	(7) FE: Linear FS	(8) FE: Linear 1ST CS	(9) FE: Linear 2ND CS	(10) FE: Spline FS	(11) FE: Spline 1ST CS	(12) FE: Spline 2ND CS
Between 20 and 40 Students				-0.0112	-0.0110	-0.00364				-0.0216	-0.0357*	-0.0343
				(0.0143)	(0.0169)	(0.0268)				(0.0152)	(0.0185)	(0.0333)
Between 40 and 60 Students				-0.0180	-0.0176	-0.00792				-0.0403***	-0.0467**	-0.0471
				(0.0140)	(0.0165)	(0.0260)				(0.0156)	(0.0192)	(0.0338)
Between 60 and 80 Students				-0.0227	-0.0201	-0.0123				-0.0586***	-0.0671***	-0.0666*
				(0.0139)	(0.0165)	(0.0259)				(0.0159)	(0.0194)	(0.0341)
Over 80 Students				-0.0407**	-0.0416**	-0.0505*				-0.0814***	-0.0928***	-0.0959***
				(0.0175)	(0.0198)	(0.0293)				(0.0179)	(0.0211)	(0.0369)
Dummy for the First Time a Professor Teaches	-0.0567***	-0.0561***	-0.0694***	-0.0568***	-0.0561***	-0.0696***	-0.00958	-0.00352	-0.0195	-0.00869	-0.00255	-0.0177
	(0.00986)	(0.0106)	(0.0133)	(0.00987)	(0.0106)	(0.0133)	(0.00964)	(0.0107)	(0.0157)	(0.00966)	(0.0107)	(0.0159)
Class Size	-0.0137**	-0.0122*	-0.0120				-0.0470***	-0.0492***	-0.0536***			
	(0.00637)	(0.00701)	(0.00986)				(0.00843)	(0.00950)	(0.0127)			
Constant	4.316***	4.311***	4.309***	4.281***	4.281***	4.272***	4.459***	4.461***	4.492***	4.317***	4.319***	4.331***
	(0.0295)	(0.0313)	(0.0418)	(0.0206)	(0.0222)	(0.0304)	(0.0362)	(0.0410)	(0.0533)	(0.0208)	(0.0243)	(0.0381)
Observations	3421	2868	1632	3421	2868	1632	3421	2868	1632	3421	2868	1632
R^2	0.042	0.047	0.061	0.043	0.048	0.064	0.729	0.753	0.811	0.728	0.752	0.810

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses

C.2 Dropping 1996 and 1997

Table A.13: Course Aspects

VARIABLES	(1) OLS: Linear	(2) OLS: Spline	(3) FE: Linear	(4) FE: Spline
Between 20 and 40 Students		-0.0108		-0.0201
		(0.0164)		(0.0172)
Between 40 and 50 Students		-0.0250		-0.0281
		(0.0170)		(0.0177)
Between 50 and 60 Students		-0.0241		-0.0403**
		(0.0165)		(0.0180)
Between 60 and 70 Students		-0.0309*		-0.0530***
		(0.0166)		(0.0180)
Between 70 and 80 Students		-0.0298*		-0.0502***
		(0.0172)		(0.0187)
Between 80 and 90 Students		-0.0591***		-0.0585***
		(0.0204)		(0.0209)
Over 90 Students		-0.0727**		-0.0677***
		(0.0331)		(0.0254)
Dummy for the First Time a Professor Teaches	-0.0364***	-0.0370***	-0.00940	-0.00926
	(0.0102)	(0.0102)	(0.0104)	(0.0104)
Class Size	-0.0221***		-0.0323***	
	(0.00712)		(0.00889)	
Constant	4.342***	4.281***	4.370***	4.283***
	(0.0328)	(0.0212)	(0.0366)	(0.0192)
Observations	3000	3000	3000	3000
R^2	0.037	0.039	0.691	0.692

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses

Table A.14: Evaluation Aspects

VARIABLES	(1) OLS: Linear	(2) OLS: Spline	(3) FE: Linear	(4) FE: Spline
Between 20 and 40 Students		-0.00413		-0.0284
		(0.0152)		(0.0176)
Between 40 and 50 Students		-0.000117		-0.0263
		(0.0157)		(0.0184)
Between 50 and 60 Students		-0.00654		-0.0460**
		(0.0154)		(0.0182)
Between 60 and 70 Students		-0.00737		-0.0600***
		(0.0150)		(0.0181)
Between 70 and 80 Students		0.00268		-0.0547***
		(0.0156)		(0.0188)
Between 80 and 90 Students		-0.0267		-0.0811***
		(0.0194)		(0.0215)
Over 90 Students		-0.00699		-0.0607***
		(0.0261)		(0.0230)
Dummy for the First Time a Professor Teaches	-0.0178*	-0.0178*	-0.00848	-0.00790
	(0.00993)	(0.00995)	(0.0107)	(0.0106)
Class Size	-0.00237		-0.0350***	
	(0.00656)		(0.00889)	
Constant	4.332***	4.328***	4.433***	4.342***
	(0.0279)	(0.0167)	(0.0362)	(0.0189)
Observations	3000	3000	3000	3000
R^2	0.082	0.083	0.660	0.662

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses

Table A.15: Recommendation

VARIABLES	(1) OLS: Linear	(2) OLS: Spline	(3) FE: Linear	(4) FE: Spline
Between 20 and 40 Students		-0.0136		0.000957
		(0.0300)		(0.0355)
Between 40 and 50 Students		-0.0607*		-0.0229
		(0.0331)		(0.0381)
Between 50 and 60 Students		-0.0385		-0.0646*
		(0.0311)		(0.0382)
Between 60 and 70 Students		-0.0306		-0.0774**
		(0.0302)		(0.0387)
Between 70 and 80 Students		-0.00786		-0.0811**
		(0.0324)		(0.0405)
Between 80 and 90 Students		-0.00666		-0.0763*
		(0.0394)		(0.0432)
Over 90 Students		-0.00894		-0.0839
		(0.0633)		(0.0538)
Dummy for the First Time a Professor Teaches	-0.116***	-0.114***	-0.0107	-0.0108
	(0.0258)	(0.0257)	(0.0251)	(0.0250)
Class Size	-0.0115		-0.0678***	
	(0.0136)		(0.0206)	
Constant	4.384***	4.367***	4.536***	4.322***
	(0.0587)	(0.0347)	(0.0811)	(0.0367)
Observations	2997	2997	2997	2997
R^2	0.037	0.039	0.710	0.711

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses

D Histograms for Change in Ranking Generated by Including Grades as a Control

Table A.16: Satisfaction

VARIABLES	(1) OLS: Linear	(2) OLS: Spline	(3) FE: Linear	(4) FE: Spline
Between 20 and 40 Students		0.0168		-0.00674
		(0.0343)		(0.0369)
Between 40 and 50 Students		-0.0214		-0.0468
		(0.0369)		(0.0385)
Between 50 and 60 Students		0.00725		-0.0651*
		(0.0345)		(0.0381)
Between 60 and 70 Students		0.00252		-0.0837**
		(0.0344)		(0.0383)
Between 70 and 80 Students		0.0126		-0.0833**
		(0.0355)		(0.0397)
Between 80 and 90 Students		-0.00254		-0.0771*
		(0.0406)		(0.0447)
Over 90 Students		-0.00824		-0.121**
		(0.0599)		(0.0535)
Dummy for the First Time a Professor Teaches	-0.0946***	-0.0949***	0.00157	0.00142
	(0.0237)	(0.0238)	(0.0235)	(0.0233)
Class Size	-0.00146		-0.0684***	
	(0.0143)		(0.0193)	
Constant	4.177***	4.169***	4.559***	4.350***
	(0.0631)	(0.0431)	(0.0756)	(0.0371)
Observations	2998	2998	2998	2998
R^2	0.053	0.055	0.688	0.688

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

E Comparison Between Different Fixed Effect Specifications

Table A.17: Teacher's Work

VARIABLES	(1) OLS: Linear	(2) OLS: Spline	(3) FE: Linear	(4) FE: Spline
Between 20 and 40 Students		-0.0189		-0.0158
		(0.0140)		(0.0156)
Between 40 and 50 Students		-0.0242		-0.0243
		(0.0148)		(0.0165)
Between 50 and 60 Students		-0.0279*		-0.0455***
		(0.0144)		(0.0166)
Between 60 and 70 Students		-0.0325**		-0.0555***
		(0.0141)		(0.0166)
Between 70 and 80 Students		-0.0240		-0.0542***
		(0.0149)		(0.0173)
Between 80 and 90 Students		-0.0357*		-0.0679***
		(0.0186)		(0.0191)
Over 90 Students		-0.0557*		-0.0606**
		(0.0309)		(0.0251)
Dummy for the First Time a Professor Teaches	-0.0501***	-0.0500***	-0.00202	-0.00152
	(0.0106)	(0.0107)	(0.0103)	(0.0103)
Class Size	-0.0156**		-0.0414***	
	(0.00636)		(0.00895)	
Constant	4.409***	4.375***	4.482***	4.361***
	(0.0273)	(0.0159)	(0.0362)	(0.0171)
Observations	3000	3000	3000	3000
R^2	0.030	0.031	0.720	0.721

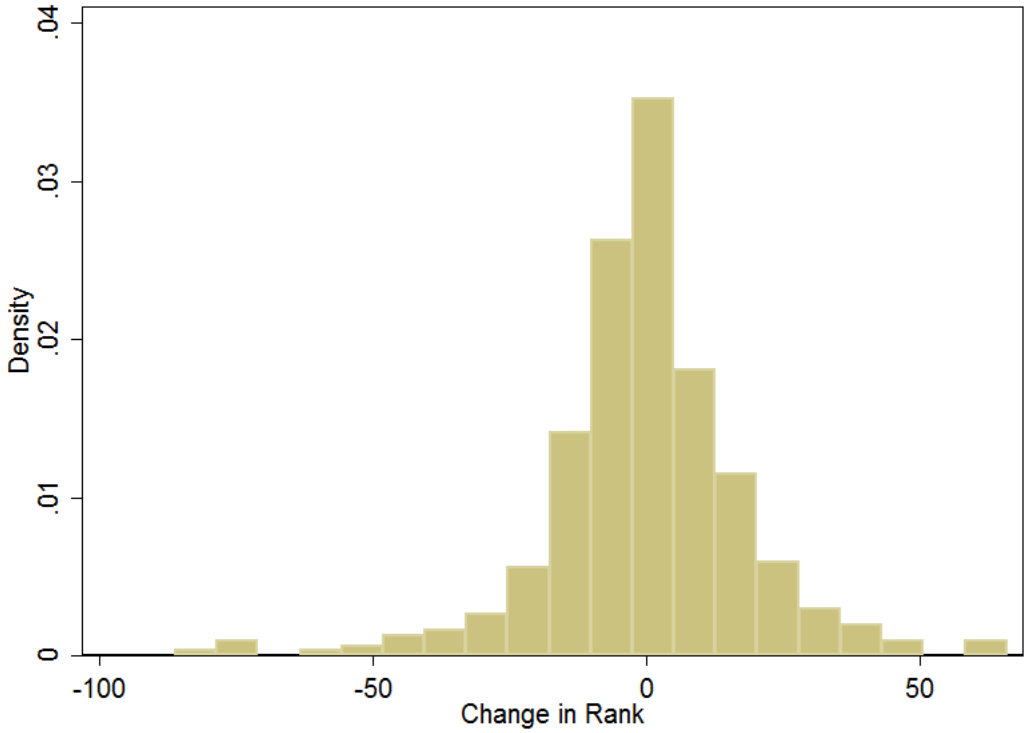
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.18: Comparison Between Fixed Effect Specifications

VARIABLES	(1) TW	(2) TW	(3) EA	(4) EA	(5) CA	(6) CA	(7) REC	(8) REC	(9) SAT	(10) SAT
Type of Fixed Efects	Joint	Separate	Joint	Separate	Joint	Separate	Joint	Separate	Joint	Separate
20≤ Students < 40	-0.0217	-0.0216	-0.0370**	-0.0381***	-0.0275*	-0.0246	-0.0233	-0.0278	-0.0208	-0.0289
	(0.0152)	(0.0139)	(0.0166)	(0.0146)	(0.0166)	(0.0153)	(0.0326)	(0.0301)	(0.0347)	(0.0325)
40≤ Students < 50	-0.0335**	-0.0380***	-0.0437**	-0.0505***	-0.0378**	-0.0370**	-0.0446	-0.0640*	-0.0561	-0.0745**
	(0.0160)	(0.0146)	(0.0174)	(0.0154)	(0.0171)	(0.0158)	(0.0354)	(0.0327)	(0.0363)	(0.0341)
50≤ Students < 60	-0.0471***	-0.0480***	-0.0555***	-0.0562***	-0.0451***	-0.0399**	-0.0686*	-0.0671**	-0.0653*	-0.0681**
	(0.0161)	(0.0146)	(0.0172)	(0.0152)	(0.0174)	(0.0160)	(0.0358)	(0.0328)	(0.0365)	(0.0339)
60≤ Students < 70	-0.0598***	-0.0605***	-0.0716***	-0.0735***	-0.0585***	-0.0557***	-0.0864**	-0.0923***	-0.0859**	-0.0976***
	(0.0160)	(0.0145)	(0.0171)	(0.0150)	(0.0174)	(0.0159)	(0.0361)	(0.0330)	(0.0368)	(0.0341)
70≤ Students < 80	-0.0606***	-0.0618***	-0.0667***	-0.0652***	-0.0592***	-0.0548***	-0.0920**	-0.0886**	-0.0897**	-0.0883**
	(0.0166)	(0.0153)	(0.0177)	(0.0158)	(0.0180)	(0.0167)	(0.0380)	(0.0351)	(0.0388)	(0.0363)
80≤ Students < 90	-0.0856***	-0.0847***	-0.0985***	-0.0946***	-0.0716***	-0.0648***	-0.127***	-0.136***	-0.124***	-0.137***
	(0.0184)	(0.0175)	(0.0205)	(0.0186)	(0.0198)	(0.0187)	(0.0427)	(0.0409)	(0.0442)	(0.0412)
Students ≥ 90	-0.0734***	-0.0818***	-0.0744***	-0.0719***	-0.0823***	-0.0868***	-0.116**	-0.117**	-0.146***	-0.147***
	(0.0236)	(0.0226)	(0.0223)	(0.0210)	(0.0242)	(0.0224)	(0.0501)	(0.0499)	(0.0511)	(0.0497)
Constant	4.315***	4.371***	4.245***	4.295***	4.366***	4.412***	4.182***	4.273***	4.221***	4.348***
	(0.0210)	(0.0308)	(0.0229)	(0.0317)	(0.0215)	(0.0301)	(0.0539)	(0.0885)	(0.0513)	(0.0747)
Observations	3421	3421	3421	3421	3421	3421	3415	3415	3418	3418
R^2	0.728	0.671	0.672	0.614	0.690	0.631	0.715	0.632	0.701	0.627

*** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses
Note: TW: Teacher's Work; EA: Evaluation Aspects; CA: Course Aspects; REC: Recommendation; SAT: Satisfaction.
Note: Joint refers to professor-course fixed effects (μ_{ci}) while separate refers to separate professor and course fixed effects (μ_i and δ_c).

Figure A.1: Course Aspects Index



F Comparison Between Business School and Economics Department

F.1 Business School

Figure A.2: Evaluation Aspects Index

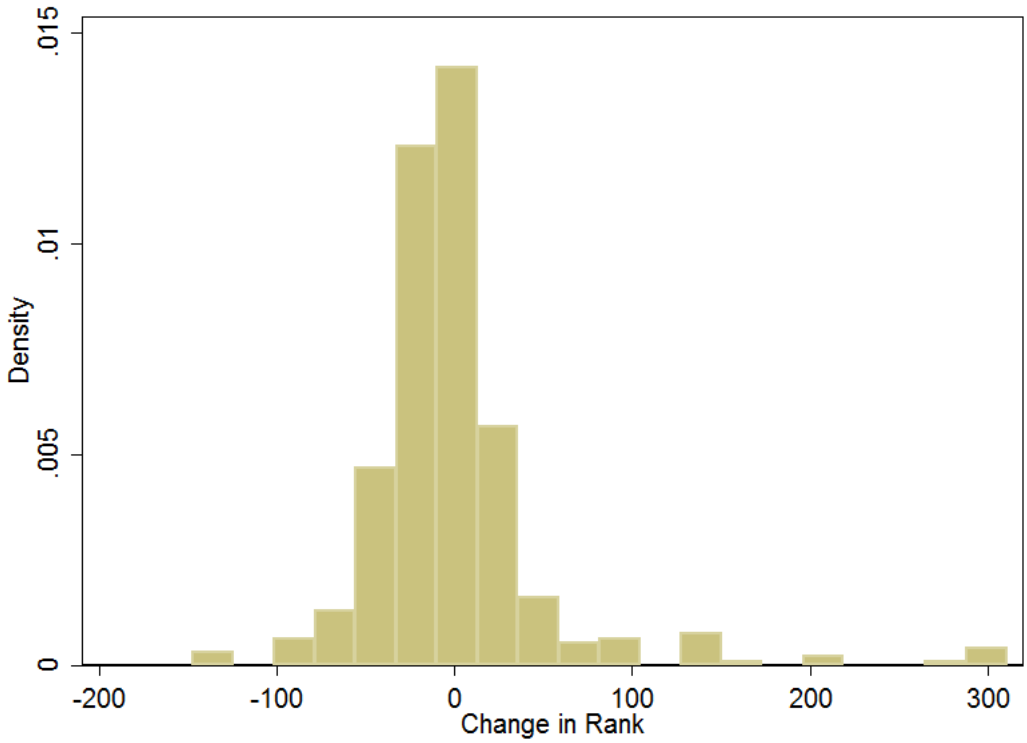


Figure A.3: Recommendation Index

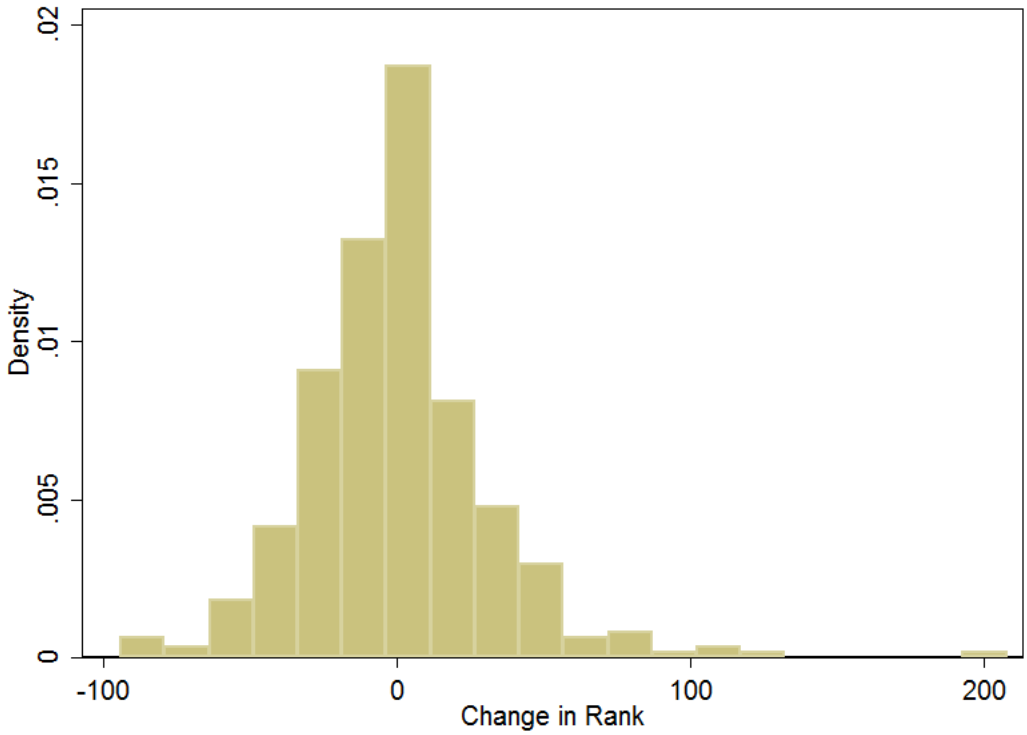


Figure A.4: Satisfaction Index

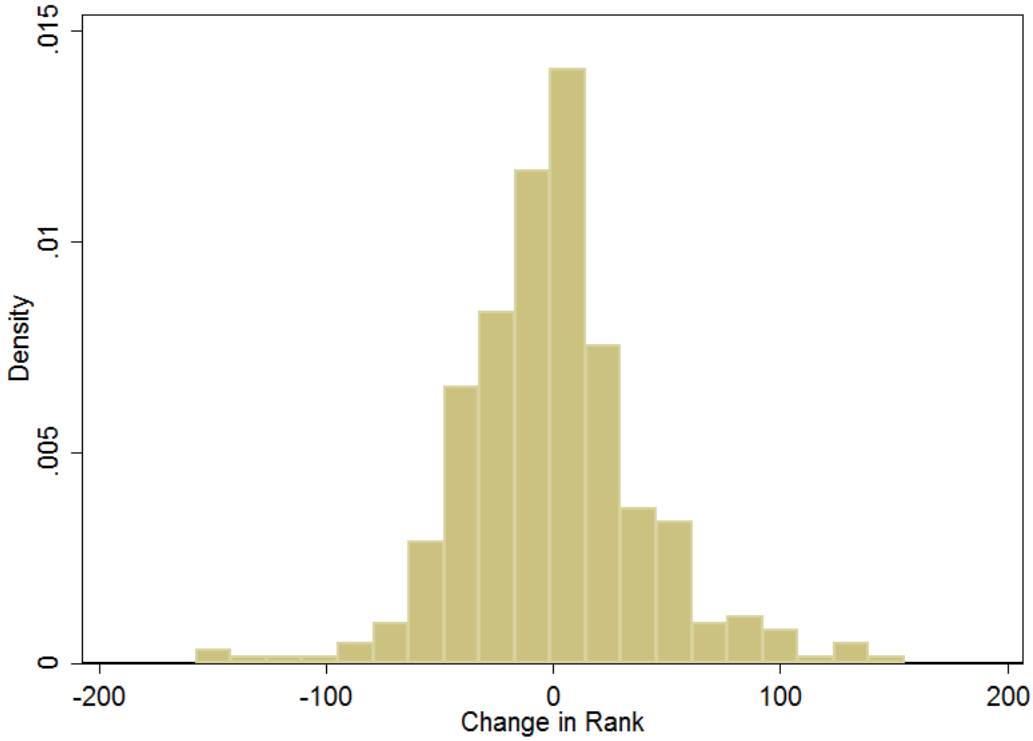


Figure A.5: Teacher's Work Index

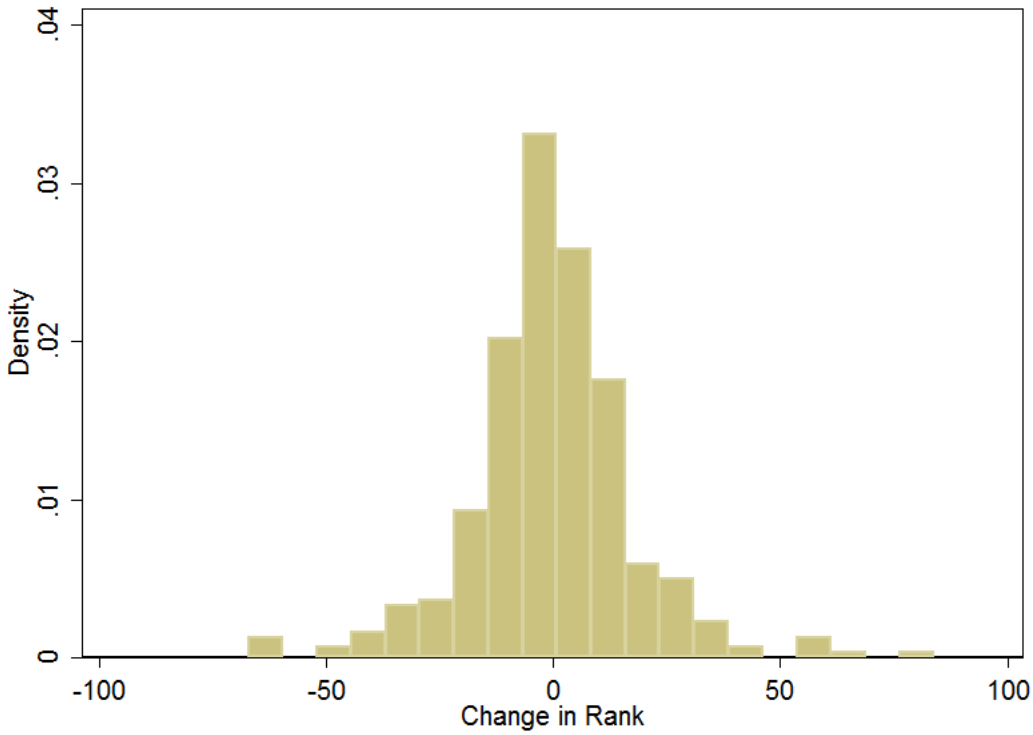


Table A.19: Determinants of Teacher Fixed Effects - Business Teachers Only, Course Aspects Index

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Age	-2.228***	-2.281***	-2.281***	-2.302***	-2.174***	-2.174***
	(0.663)	(0.662)	(0.662)	(0.671)	(0.648)	(0.650)
Age Squared	0.0190**	0.0195***	0.0195***	0.0195***	0.0184**	0.0184**
	(0.00738)	(0.00737)	(0.00737)	(0.00748)	(0.00718)	(0.00720)
Full-Time Dummy	7.656***	7.724***	7.723***	7.912***	6.978***	6.954***
	(2.567)	(2.564)	(2.564)	(2.605)	(2.570)	(2.608)
Ph.D Dummy	4.652*	3.957	3.988	4.507	5.993**	5.923**
	(2.648)	(2.641)	(2.639)	(2.862)	(2.821)	(2.835)
Foreign Masters Degree Dummy	-1.109	-0.461	-0.475	-0.784	-0.637	-0.661
	(2.379)	(2.400)	(2.398)	(2.434)	(2.453)	(2.474)
Domestic Masters Degree Dummy	0.818	0.945	0.946	0.819	0.864	0.818
	(1.643)	(1.652)	(1.652)	(1.649)	(1.618)	(1.743)
Foreign MBA Dummy	0.215	0.524	0.521	0.280	0.439	0.442
	(2.612)	(2.628)	(2.629)	(2.675)	(2.610)	(2.620)
Domestic MBA Dummy	-1.624	-1.398	-1.402	-1.619	-1.349	-1.350
	(2.647)	(2.652)	(2.652)	(2.685)	(2.659)	(2.666)
Business Experience Dummy	1.411	1.489	1.504	1.631	3.435	3.443
	(2.064)	(2.057)	(2.056)	(2.117)	(2.493)	(2.504)
Presence in Repec Dummy	-2.300	-4.770	-4.926	11.71		
	(4.404)	(4.089)	(4.178)	(10.39)		
Repec Citations			0.408***	1.813***		
			(0.102)	(0.562)		
Repec Downloads				-0.0165		
				(0.0462)		
Repec Abstract Views				-0.0226		
				(0.0205)		
Top 20 Chileans in Repec Dummy		18.51***				
		(4.443)				
Presence in Google Scholar Dummy					-3.336	-3.366
					(2.599)	(2.643)
Number of Google Scholar Citations						0.000633
						(0.00375)
Observations	198	198	198	198	198	198
R^2	0.212	0.222	0.221	0.233	0.218	0.218

*** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses

Table A.20: Determinants of Teacher Fixed Effects - Business Teachers Only, Evaluation Aspects Index

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Age	-1.351**	-1.367**	-1.367**	-1.385**	-1.271*	-1.270*
	(0.674)	(0.678)	(0.678)	(0.683)	(0.664)	(0.663)
Age Squared	0.0114	0.0115	0.0115	0.0116	0.0106	0.0105
	(0.00750)	(0.00754)	(0.00754)	(0.00760)	(0.00735)	(0.00734)
Full-Time Dummy	3.699	3.720	3.720	3.868	3.046	3.190
	(2.413)	(2.412)	(2.412)	(2.458)	(2.370)	(2.398)
Ph.D Dummy	2.316	2.100	2.115	1.752	4.120*	4.536*
	(2.396)	(2.465)	(2.461)	(2.649)	(2.386)	(2.404)
Foreign Masters Degree Dummy	0.444	0.645	0.636	0.490	1.032	1.174
	(2.331)	(2.411)	(2.410)	(2.449)	(2.370)	(2.373)
Domestic Masters Degree Dummy	-1.521	-1.481	-1.482	-1.560	-1.512	-1.234
	(1.707)	(1.716)	(1.716)	(1.718)	(1.648)	(1.780)
Foreign MBA Dummy	1.581	1.677	1.674	1.610	1.788	1.770
	(2.331)	(2.359)	(2.359)	(2.398)	(2.287)	(2.301)
Domestic MBA Dummy	1.104	1.175	1.171	1.131	1.397	1.406
	(2.491)	(2.511)	(2.511)	(2.535)	(2.442)	(2.448)
Business Experience Dummy	-1.692	-1.668	-1.664	-1.850	0.925	0.881
	(1.875)	(1.876)	(1.875)	(1.940)	(2.236)	(2.241)
Presence in Repec Dummy	-1.587	-2.356	-2.384	-2.006		
	(3.624)	(3.925)	(3.996)	(11.45)		
Repec Citations			0.124	0.447		
			(0.104)	(0.626)		
Repec Downloads				-0.0712*		
				(0.0410)		
Repec Abstract Views				0.0131		
				(0.0190)		
Top 20 Chileans in Repec Dummy		5.759				
		(4.439)				
Presence in Google Scholar Dummy					-4.270*	-4.093
					(2.563)	(2.619)
Number of Google Scholar Citations						-0.00378
						(0.00391)
Observations	198	198	198	198	198	198
R^2	0.113	0.114	0.114	0.118	0.128	0.129

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses

Table A.21: Determinants of Teacher Fixed Effects - Business Teachers Only, Recommendation Index

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Age	-1.390	-1.457	-1.457	-1.494*	-1.332	-1.332
	(0.900)	(0.903)	(0.903)	(0.903)	(0.928)	(0.934)
Age Squared	0.0101	0.0108	0.0108	0.0109	0.00964	0.00966
	(0.00950)	(0.00953)	(0.00954)	(0.00951)	(0.00984)	(0.00990)
Full-Time Dummy	13.85***	13.93***	13.93***	14.25***	11.19**	11.06**
	(4.442)	(4.461)	(4.460)	(4.522)	(4.333)	(4.449)
Ph.D Dummy	3.982	3.091	3.128	3.677	6.444	6.065
	(4.886)	(4.916)	(4.911)	(5.347)	(5.867)	(5.880)
Foreign Masters Degree Dummy	-3.432	-2.603	-2.618	-3.093	-2.317	-2.446
	(3.316)	(3.344)	(3.341)	(3.343)	(3.458)	(3.462)
Domestic Masters Degree Dummy	-0.948	-0.785	-0.784	-0.986	-0.572	-0.826
	(3.555)	(3.570)	(3.570)	(3.589)	(3.490)	(3.737)
Foreign MBA Dummy	-4.297	-3.902	-3.904	-4.255	-3.370	-3.354
	(4.105)	(4.130)	(4.130)	(4.201)	(4.109)	(4.123)
Domestic MBA Dummy	-5.137	-4.847	-4.852	-5.160	-4.213	-4.221
	(5.407)	(5.425)	(5.425)	(5.469)	(5.431)	(5.443)
Business Experience Dummy	3.370	3.470	3.489	3.585	7.663	7.703
	(3.323)	(3.331)	(3.330)	(3.460)	(4.846)	(4.881)
Presence in Repec Dummy	-12.39*	-15.55**	-15.76**	6.757		
	(7.167)	(7.173)	(7.301)	(17.96)		
Repec Citations			0.524***	2.546***		
			(0.159)	(0.894)		
Repec Downloads				-0.0515		
				(0.0751)		
Repec Abstract Views				-0.0250		
				(0.0320)		
Top 20 Chileans in Repec Dummy		23.70***				
		(6.846)				
Presence in Google Scholar Dummy					-7.309	-7.470
					(4.732)	(4.833)
Number of Google Scholar Citations						0.00345
						(0.00796)
Observations	198	198	198	198	198	198
R^2	0.107	0.114	0.114	0.124	0.109	0.109

*** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses

Table A.22: Determinants of Teacher Fixed Effects - Business Teachers Only, Satisfaction Index

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Age	-1.665*	-1.703**	-1.702**	-1.757**	-1.595*	-1.596*
	(0.853)	(0.855)	(0.855)	(0.854)	(0.869)	(0.874)
Age Squared	0.0118	0.0122	0.0122	0.0124	0.0112	0.0112
	(0.00905)	(0.00907)	(0.00907)	(0.00904)	(0.00920)	(0.00927)
Full-Time Dummy	15.57***	15.62***	15.62***	16.08***	14.11***	13.98***
	(3.865)	(3.874)	(3.874)	(3.918)	(3.907)	(3.992)
Ph.D Dummy	6.990	6.497	6.527	6.981	9.041*	8.658
	(4.635)	(4.693)	(4.690)	(5.062)	(5.339)	(5.325)
Foreign Masters Degree Dummy	-4.903	-4.444	-4.461	-5.112	-4.107	-4.238
	(3.499)	(3.624)	(3.620)	(3.623)	(3.650)	(3.663)
Domestic Masters Degree Dummy	1.803	1.893	1.892	1.607	1.961	1.704
	(2.875)	(2.890)	(2.890)	(2.881)	(2.805)	(3.004)
Foreign MBA Dummy	-2.888	-2.669	-2.675	-3.131	-2.391	-2.374
	(3.824)	(3.861)	(3.861)	(3.924)	(3.825)	(3.836)
Domestic MBA Dummy	-2.909	-2.749	-2.754	-3.146	-2.363	-2.371
	(5.604)	(5.624)	(5.624)	(5.667)	(5.645)	(5.654)
Business Experience Dummy	2.675	2.730	2.739	2.749	5.944	5.985
	(3.140)	(3.149)	(3.149)	(3.228)	(4.585)	(4.617)
Presence in Repec Dummy	-5.960	-7.710	-7.790	19.39		
	(7.378)	(8.000)	(8.096)	(16.91)		
Repec Citations			0.284	2.888***		
			(0.185)	(0.954)		
Repec Downloads				-0.102		
				(0.0970)		
Repec Abstract Views				-0.0226		
				(0.0371)		
Top 20 Chileans in Repec Dummy		13.11				
		(8.277)				
Presence in Google Scholar Dummy					-5.458	-5.621
					(4.679)	(4.768)
Number of Google Scholar Citations						0.00349
						(0.00650)
Observations	198	198	198	198	198	198
R^2	0.161	0.163	0.163	0.181	0.166	0.166

*** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses

Table A.23: Determinants of Teacher Fixed Effects - Business Teachers Only, Teacher's Work Index

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Age	-1.292**	-1.332**	-1.332**	-1.348**	-1.199*	-1.199*
	(0.649)	(0.648)	(0.649)	(0.655)	(0.641)	(0.640)
Age Squared	0.0114	0.0118*	0.0118*	0.0118	0.0105	0.0105
	(0.00712)	(0.00710)	(0.00711)	(0.00718)	(0.00698)	(0.00697)
Full-Time Dummy	7.824***	7.876***	7.875***	8.006***	6.741***	6.841***
	(2.608)	(2.606)	(2.605)	(2.649)	(2.479)	(2.524)
Ph.D Dummy	0.0989	-0.428	-0.407	-0.337	2.365	2.656
	(2.851)	(2.876)	(2.873)	(3.114)	(3.120)	(3.120)
Foreign Masters Degree Dummy	-0.703	-0.213	-0.220	-0.397	0.0821	0.182
	(2.241)	(2.270)	(2.269)	(2.304)	(2.257)	(2.278)
Domestic Masters Degree Dummy	-1.643	-1.547	-1.546	-1.625	-1.578	-1.383
	(2.054)	(2.063)	(2.063)	(2.074)	(1.985)	(2.144)
Foreign MBA Dummy	0.735	0.969	0.968	0.849	1.091	1.079
	(2.397)	(2.411)	(2.411)	(2.455)	(2.357)	(2.367)
Domestic MBA Dummy	-1.550	-1.379	-1.382	-1.483	-1.104	-1.098
	(3.138)	(3.152)	(3.152)	(3.180)	(3.106)	(3.114)
Business Experience Dummy	-0.143	-0.0845	-0.0728	-0.0918	3.252	3.221
	(2.142)	(2.142)	(2.142)	(2.235)	(2.794)	(2.802)
Presence in Repec Dummy	-3.520	-5.394	-5.521	1.211		
	(4.015)	(3.961)	(4.034)	(11.34)		
Repec Citations			0.311***	0.989*		
			(0.0958)	(0.572)		
Repec Downloads				-0.0332		
				(0.0430)		
Repec Abstract Views				-0.00405		
				(0.0186)		
Top 20 Chileans in Repec Dummy		14.03***				
		(4.111)				
Presence in Google Scholar Dummy					-5.585*	-5.461*
					(2.840)	(2.901)
Number of Google Scholar Citations						-0.00265
						(0.00403)
Observations	198	198	198	198	198	198
R^2	0.103	0.109	0.109	0.112	0.122	0.123

*** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses

F.2 Economics Department

Table A.24: Determinants of Teacher Fixed Effects - Economics Teachers Only, Course Aspects Index

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Age	-1.019**	-1.121***	-1.211***	-1.188***	-1.116***	-1.386***
	(0.408)	(0.407)	(0.403)	(0.411)	(0.404)	(0.398)
Age Squared	0.00701*	0.00812*	0.00844**	0.00825*	0.00828**	0.0107**
	(0.00417)	(0.00426)	(0.00423)	(0.00431)	(0.00412)	(0.00413)
Full-Time Dummy	8.283***	8.919***	9.971***	10.17***	7.214***	7.108***
	(2.580)	(2.334)	(2.417)	(2.459)	(2.379)	(2.172)
Ph.D Dummy	3.073	1.748	1.861	1.685	2.439	0.190
	(2.174)	(2.141)	(2.131)	(2.153)	(2.180)	(2.145)
Foreign Masters Degree Dummy	1.699	1.802	2.298	2.069	1.596	2.207
	(1.912)	(1.800)	(1.854)	(1.903)	(1.927)	(1.692)
Domestic Masters Degree Dummy	3.361**	3.723***	2.600**	2.575**	3.363**	2.506*
	(1.412)	(1.329)	(1.267)	(1.280)	(1.402)	(1.343)
Foreign MBA Dummy	0.519	0.398	0.893	0.800	1.016	1.661
	(2.418)	(2.383)	(2.407)	(2.432)	(2.295)	(2.362)
Domestic MBA Dummy	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
Business Experience Dummy	1.664	1.884	1.793	1.829	1.325	1.455
	(1.461)	(1.403)	(1.394)	(1.389)	(1.462)	(1.407)
Presence in Repec Dummy	-2.664	-5.500***	-4.859***	-5.419***		
	(1.854)	(1.655)	(1.690)	(1.758)		
Repec Citations			0.0240**	-0.0339		
			(0.0109)	(0.0335)		
Repec Downloads				0.00231		
				(0.00344)		
Repec Abstract Views				1.93e-05		
				(0.000908)		
Top 20 Chileans in Repec Dummy		9.155***				
		(2.856)				
Presence in Google Scholar Dummy					0.594	0.124
					(1.278)	(1.282)
Number of Google Scholar Citations						0.00945***
						(0.00344)
Observations	160	159	159	159	160	160
R^2	0.273	0.319	0.321	0.327	0.261	0.326

*** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses

Table A.25: Determinants of Teacher Fixed Effects - Economics Teachers Only, Evaluation Aspects Index

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Age	-1.454***	-1.439***	-1.437***	-1.435***	-1.459***	-1.471***
	(0.404)	(0.407)	(0.407)	(0.408)	(0.395)	(0.399)
Age Squared	0.0119***	0.0118***	0.0117***	0.0117***	0.0120***	0.0121***
	(0.00441)	(0.00445)	(0.00443)	(0.00444)	(0.00427)	(0.00432)
Full-Time Dummy	4.312**	4.168**	4.218**	4.213**	4.020**	3.997**
	(1.689)	(1.682)	(1.713)	(1.721)	(1.584)	(1.587)
Economics Dummy	-6.251***	-6.184***	-6.185***	-6.231***	-6.348***	-6.374***
	(1.234)	(1.238)	(1.235)	(1.238)	(1.197)	(1.209)
Ph.D Dummy	3.440**	3.074**	3.132**	3.197**	3.511***	3.332**
	(1.358)	(1.419)	(1.391)	(1.405)	(1.311)	(1.418)
Foreign Masters Degree Dummy	2.007	1.927	1.910	1.915	2.120	2.131
	(1.494)	(1.493)	(1.495)	(1.499)	(1.512)	(1.517)
Domestic Masters Degree Dummy	2.652**	2.522**	2.434**	2.484**	2.653**	2.593**
	(1.193)	(1.198)	(1.192)	(1.199)	(1.189)	(1.198)
Foreign MBA Dummy	2.112	2.138	2.112	2.105	2.227	2.257
	(1.952)	(1.956)	(1.953)	(1.959)	(1.929)	(1.936)
Domestic MBA Dummy	1.707	1.701	1.676	1.679	1.881	1.893
	(2.230)	(2.237)	(2.233)	(2.240)	(2.215)	(2.221)
Business Experience Dummy	0.142	-0.00764	-0.0352	-0.0557	0.466	0.465
	(1.142)	(1.135)	(1.140)	(1.144)	(1.168)	(1.170)
Presence in Repec Dummy	-1.150	-1.074	-0.825	-0.556		
	(1.387)	(1.447)	(1.390)	(1.488)		
Repec Citations			0.00324	0.0201		
			(0.00460)	(0.0273)		
Repec Downloads				-0.000322		
				(0.00251)		
Repec Abstract Views				-0.000116		
				(0.000672)		
Top 20 Chileans in Repec Dummy		1.541				
		(1.979)				
Presence in Google Scholar Dummy					-0.979	-1.029
					(1.341)	(1.352)
Number of Google Scholar Citations						0.000945
						(0.00185)
Observations	349	348	348	348	349	349
R^2	0.199	0.192	0.192	0.192	0.199	0.199

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.26: Determinants of Teacher Fixed Effects - Economics Teachers Only, Recommendation Index

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Age	-1.085	-1.147	-1.235	-1.210	-1.140	-1.377
	(0.919)	(0.930)	(0.936)	(0.951)	(0.926)	(0.948)
Age Squared	0.00662	0.00722	0.00775	0.00756	0.00764	0.00975
	(0.00958)	(0.00969)	(0.00971)	(0.00984)	(0.00961)	(0.00981)
Full-Time Dummy	10.22**	10.59**	11.46**	11.71**	8.967**	8.874**
	(4.391)	(4.424)	(4.656)	(4.723)	(4.289)	(4.197)
Ph.D Dummy	6.858	6.553	6.199	5.930	6.170	4.190
	(4.201)	(4.568)	(4.388)	(4.450)	(4.119)	(4.478)
Foreign Masters Degree Dummy	2.738	2.913	3.256	2.880	2.681	3.219
	(3.633)	(3.656)	(3.677)	(3.778)	(3.693)	(3.549)
Domestic Masters Degree Dummy	5.568*	5.786*	5.156*	5.091*	5.735*	4.981
	(2.984)	(3.032)	(2.995)	(3.025)	(2.999)	(3.078)
Foreign MBA Dummy	-3.122	-3.116	-2.835	-2.995	-2.727	-2.159
	(9.058)	(9.073)	(9.119)	(9.209)	(8.930)	(9.065)
Domestic MBA Dummy	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
Business Experience Dummy	1.397	1.581	1.579	1.667	1.236	1.349
	(3.263)	(3.294)	(3.295)	(3.322)	(3.286)	(3.301)
Presence in Repec Dummy	-3.777	-5.054	-5.489	-6.454*		
	(3.088)	(3.399)	(3.322)	(3.385)		
Repec Citations			0.0157	-0.0718		
			(0.0135)	(0.0697)		
Repec Downloads				0.00271		
				(0.00552)		
Repec Abstract Views				0.000274		
				(0.00143)		
Top 20 Chileans in Repec Dummy		3.121				
		(5.225)				
Presence in Google Scholar Dummy					-0.868	-1.282
					(3.251)	(3.278)
Number of Google Scholar Citations						0.00832
						(0.00642)
Observations	160	159	159	159	160	160
R^2	0.125	0.127	0.130	0.133	0.120	0.131

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.27: Determinants of Teacher Fixed Effects - Economics Teachers Only, Satisfaction Index

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Age	-1.407*	-1.521**	-1.624**	-1.635**	-1.454*	-1.722**
	(0.735)	(0.738)	(0.740)	(0.749)	(0.744)	(0.752)
Age Squared	0.00977	0.0109	0.0114	0.0116	0.0107	0.0131*
	(0.00771)	(0.00778)	(0.00777)	(0.00786)	(0.00777)	(0.00786)
Full-Time Dummy	9.676**	10.36***	11.44***	11.44***	8.460**	8.354**
	(3.889)	(3.773)	(3.901)	(3.962)	(3.803)	(3.679)
Ph.D Dummy	8.449**	7.811**	7.598**	7.418**	7.789**	5.551
	(3.465)	(3.648)	(3.535)	(3.585)	(3.331)	(3.499)
Foreign Masters Degree Dummy	2.243	2.548	3.008	2.690	2.194	2.802
	(3.273)	(3.255)	(3.299)	(3.381)	(3.336)	(3.179)
Domestic Masters Degree Dummy	6.279**	6.681***	5.746**	5.629**	6.458***	5.605**
	(2.447)	(2.452)	(2.394)	(2.410)	(2.459)	(2.508)
Foreign MBA Dummy	2.469	2.469	2.883	2.728	2.833	3.475
	(3.477)	(3.523)	(3.587)	(3.647)	(3.363)	(3.453)
Domestic MBA Dummy	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
Business Experience Dummy	1.736	2.069	2.029	2.178	1.605	1.734
	(2.605)	(2.613)	(2.602)	(2.616)	(2.579)	(2.584)
Presence in Repec Dummy	-3.731	-6.156**	-6.207**	-7.159***		
	(2.712)	(2.550)	(2.622)	(2.588)		
Repec Citations			0.0216	-0.0340		
			(0.0145)	(0.0445)		
Repec Downloads				-0.000527		
				(0.00495)		
Repec Abstract Views				0.000870		
				(0.00135)		
Top 20 Chileans in Repec Dummy		6.134				
		(4.111)				
Presence in Google Scholar Dummy					-1.008	-1.476
					(2.560)	(2.568)
Number of Google Scholar Citations						0.00940*
						(0.00564)
Observations	160	159	159	159	160	160
R^2	0.205	0.216	0.223	0.226	0.198	0.219

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A.28: Determinants of Teacher Fixed Effects - Economics Teachers Only, Teacher's Work Index

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Age	-0.644	-0.748	-0.837	-0.821	-0.642	-0.844
	(0.533)	(0.534)	(0.536)	(0.545)	(0.535)	(0.546)
Age Squared	0.00370	0.00474	0.00515	0.00505	0.00407	0.00587
	(0.00562)	(0.00566)	(0.00565)	(0.00575)	(0.00558)	(0.00570)
Full-Time Dummy	7.521**	8.147***	9.122***	9.303***	6.709**	6.629**
	(3.073)	(2.996)	(3.139)	(3.175)	(2.795)	(2.680)
Ph.D Dummy	2.622	1.842	1.753	1.518	2.212	0.526
	(2.692)	(2.842)	(2.759)	(2.778)	(2.654)	(2.840)
Foreign Masters Degree Dummy	0.674	0.907	1.338	0.995	0.676	1.134
	(2.313)	(2.267)	(2.286)	(2.334)	(2.361)	(2.242)
Domestic Masters Degree Dummy	1.046	1.413	0.502	0.429	1.257	0.615
	(1.818)	(1.804)	(1.772)	(1.793)	(1.787)	(1.807)
Foreign MBA Dummy	-3.409	-3.441	-3.038	-3.188	-3.270	-2.787
	(4.406)	(4.377)	(4.471)	(4.526)	(4.468)	(4.586)
Domestic MBA Dummy	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
Business Experience Dummy	1.046	1.328	1.275	1.372	1.089	1.186
	(1.965)	(1.946)	(1.948)	(1.953)	(1.987)	(1.987)
Presence in Repec Dummy	-2.852	-5.235**	-5.060**	-5.971**		
	(2.356)	(2.425)	(2.383)	(2.424)		
Repec Citations			0.0204*	-0.0552		
			(0.0114)	(0.0337)		
Repec Downloads				0.00183		
				(0.00312)		
Repec Abstract Views				0.000394		
				(0.000887)		
Top 20 Chileans in Repec Dummy		6.548*				
		(3.513)				
Presence in Google Scholar Dummy					-1.540	-1.893
					(1.894)	(1.906)
Number of Google Scholar Citations						0.00708*
						(0.00380)
Observations	160	159	159	159	160	160
R^2	0.112	0.133	0.140	0.148	0.106	0.130

*** p<0.01, ** p<0.05, * p<0.1
Robust standard errors in parentheses