Determinants of Teacher Evaluation Results at EAFIT University

Research Practise 2: Progress presentation

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Mathematical Engineering

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Objetives

GENERAL OBJECTIVE

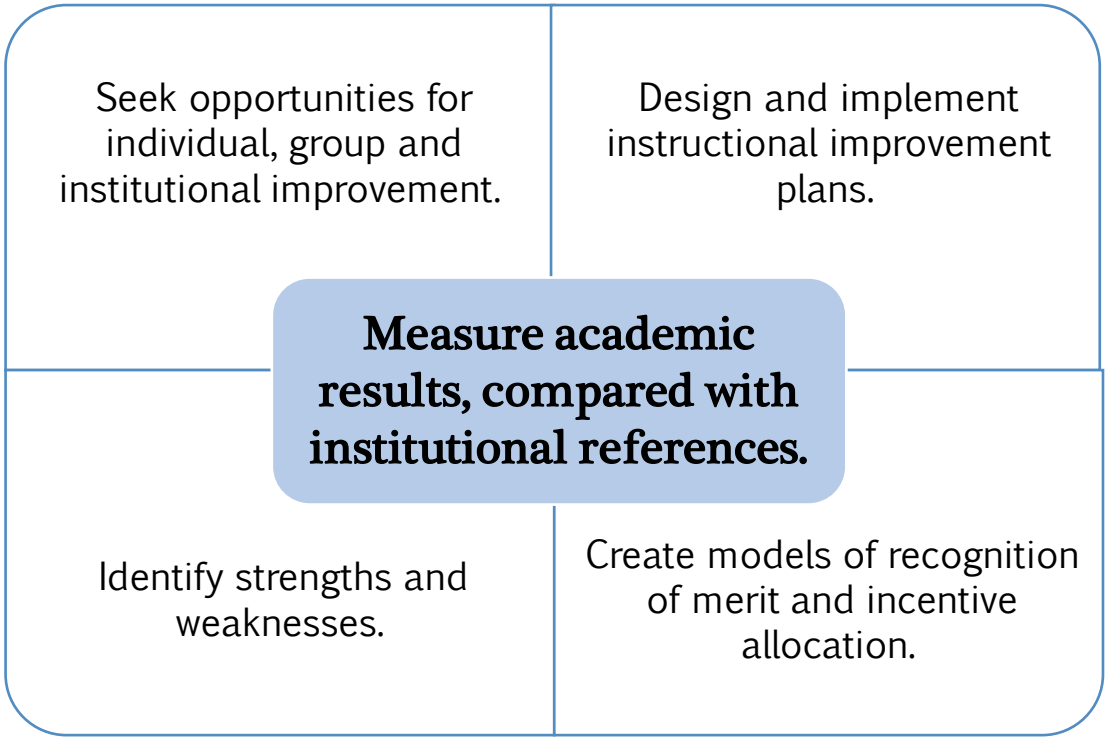
Identify the factors that influence teachers evaluation by students from School of Science of EAFIT University during semester 2015-1.

SPECIFIC OBJECTIVES

Making a framework of previous studies conducted on teacher evaluation.	In procces
Organizing database of teachers evaluation in 2015-1 and variables to consider in statistic model that will be selected.	Done
Analyzing using descriptive statistics the results of the teacher evaluation by students from School of Science at EAFIT University in 2015-1.	Done
Implementing a multivariate statistical model to explain the relationships between different explanatory variables and teacher evaluation results.	In procces

Teacher evaluation at EAFIT University

PURPOSES



Teacher evaluation at EAFIT University

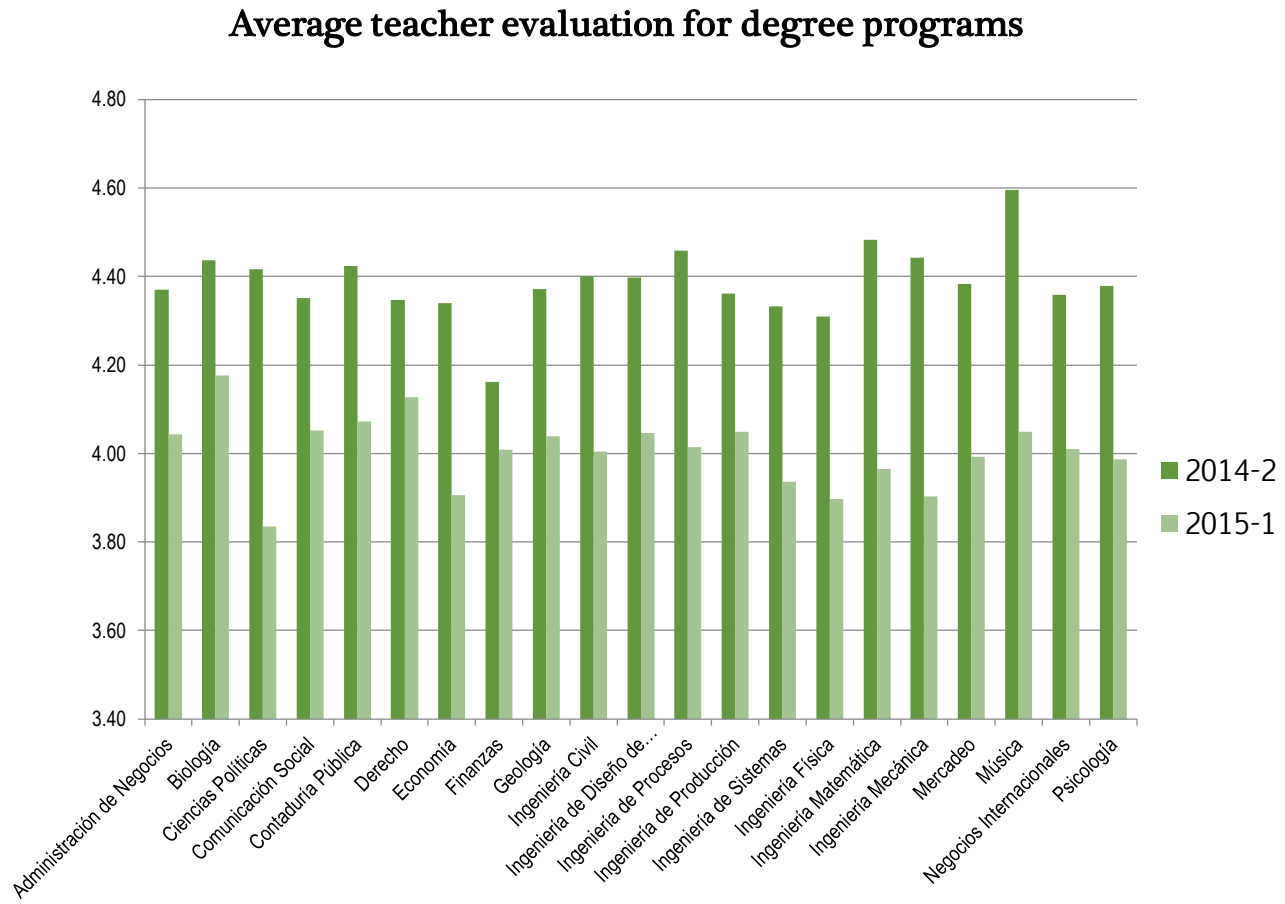
The teacher evaluation instrument used in EAFIT consists of 17 questions that are scored on a scale of 1-5

- Relation with other courses
- Course significance
- Evaluation difficulty level
- Relationship with students
- Students attention
- Motivation
- Teacher assistance
- Compliance class hours
- Compliance topics
- Foster autonomous learning
- Using resources
- Curriculum
- Comunicative skills stimulation
- Methodology
- Topics extension
- Conducting application activities
- Review evaluations

Model Variables

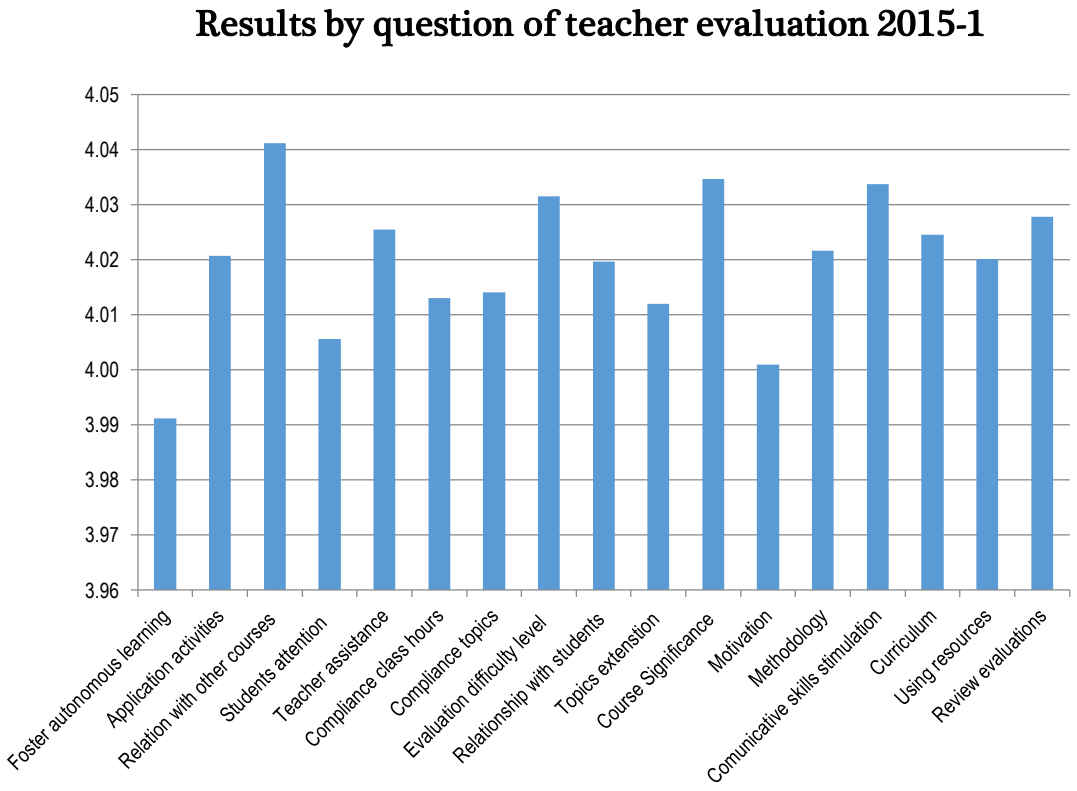
Dependent variable	Average per group of teacher evaluation of the courses of the School of Science at semester 2015-1
Explanatory variables	
Average grade	Average final grade students of the course.
Teacher contract type	Full time or partial time
Service	Management and Economics, Engineering, Science and Humanities
Schedule	Morning, afternoon or evening
Level	Basic (1^{st}-3^{th} semester), Profesional (4^{th} -7^{th} semester), Elective(8^{th} -10^{th} semester)
Class size	Number of students for each group
Student attendance	• Less than 20% • 20- 50% • 50-70% • Over 70%

Descriptive Statistics



Source: Institutional databases and authors' calculations

Descriptive Statistics

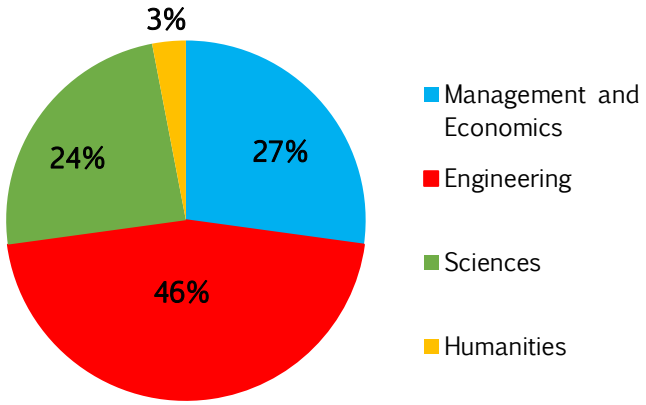


Source: Institutional databases and authors' calculations

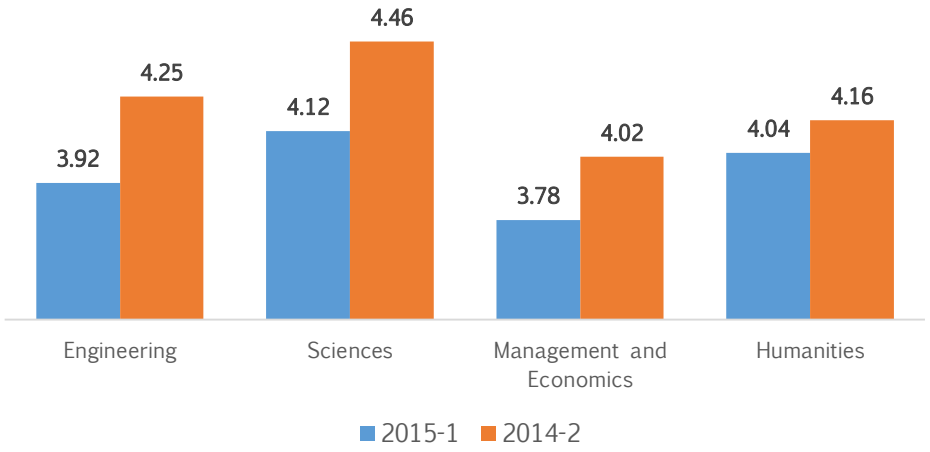
Descriptive Statistics

SCHOOL OF SCIENCE

Courses for schools



Average teacher evaluation for schools



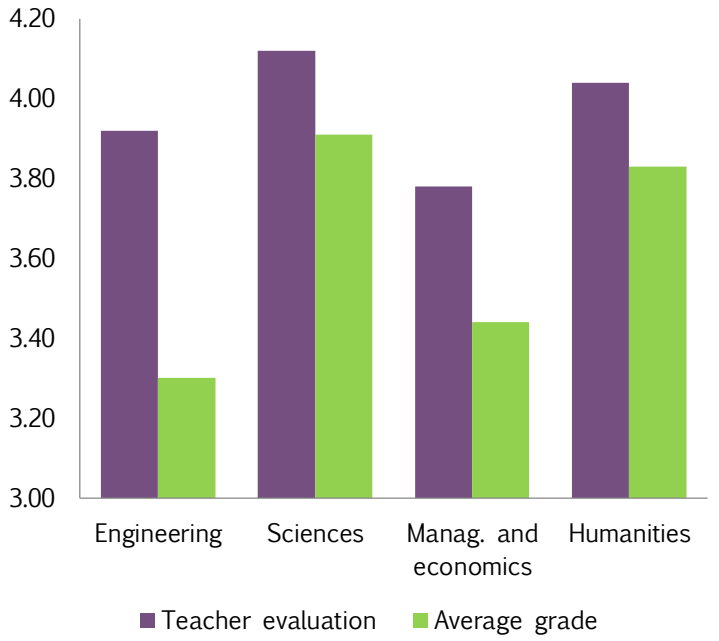
Source: Institutional databases and authors' calculations

Descriptive Statistics

Descriptive Statistics for cuantitative variables

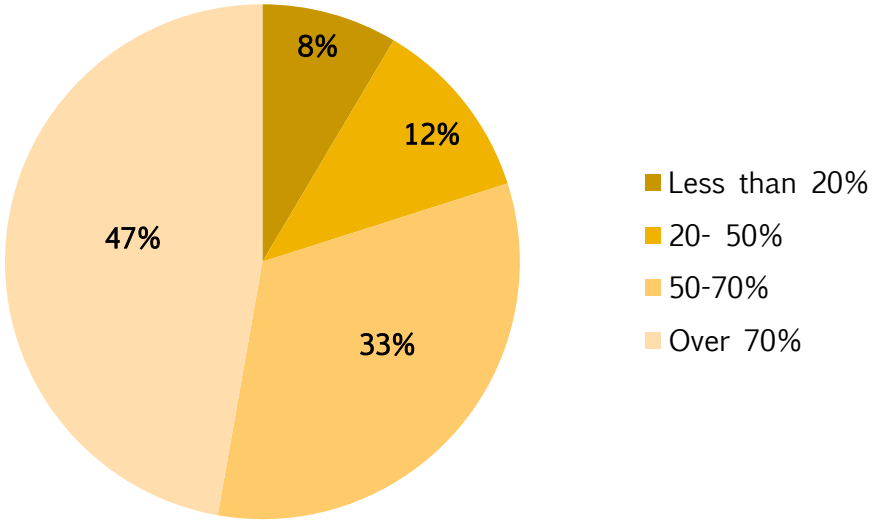
	Teacher evaluation	Average grade	Class size
Mean	3.93	3.50	21.5
Std. Dev.	0.26	0.46	8.7
Min.	2.66	2.18	3
Max.	4.78	4.94	37

Average teacher evaluation vs. Average grade

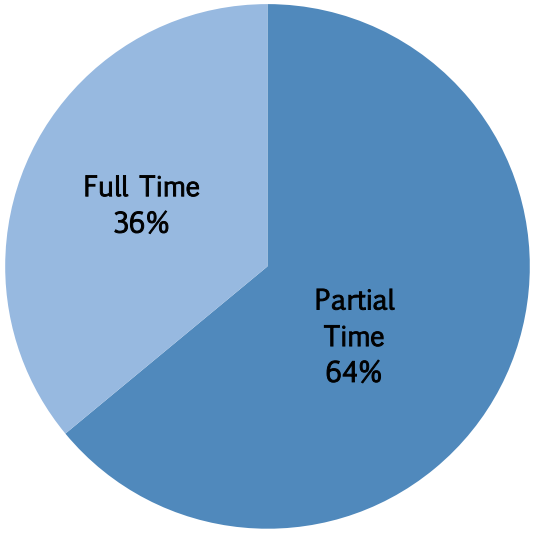


Source: Institutional databases and authors' calculations

Descriptive Statistics



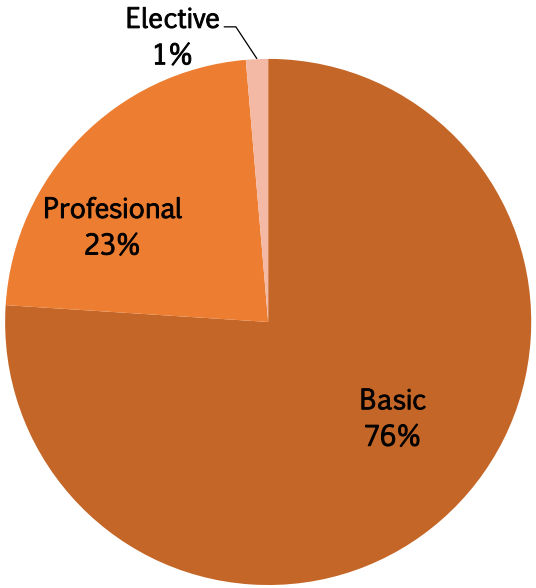
Student attendence



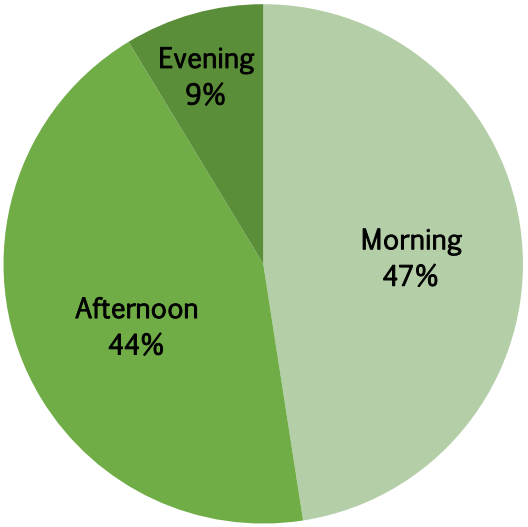
Teacher contract type

Source: Institutional databases and authors' calculations

Descriptive Statistics



Level



Schedule

Source: Institutional databases and authors' calculations

Methodology

LINEAR REGRESSION MODEL

This mathematical model is used to approximate the dependency relationship between a dependent variable Y and one or more independent variables X_i. This model can be expressed as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_p X_p + \varepsilon$$

$\boldsymbol{Y}$ Dependent variable

$\boldsymbol{X_1, X_2, \ldots, X_p}$ Independent or explainatory variables

$\boldsymbol{\beta_1, \beta_2, \ldots, \beta_p}$ parameters, measuring the influence of the explanatory variables have on the dependent variable

$\boldsymbol{\beta_0}$ is the intersection or the term "constant", and $\boldsymbol{\varepsilon}$ is a residuals or error terms vector

Methodology

ORDINARY LEAST SQUARES (OLS)

This is a method for estimating the unknown parameters in a linear regression model, with the goal of minimizing the differences between the observed responses in some arbitrary dataset and the responses predicted by the linear approximation of the data.

OLS estimator for parameters vector

$$\widehat{\boldsymbol{\beta}} = \left(\boldsymbol{X}^{\boldsymbol{T}}\boldsymbol{X}\right)^{-1}\boldsymbol{X}^{\boldsymbol{T}}\boldsymbol{Y}$$

$\boldsymbol{Y}$ Dependent variable matrix
$\boldsymbol{X}$ Explainatory variables
$\boldsymbol{\beta}$ parameters vector

Markov Gauss theorem: The OLS estimator has minimum variance

Methodology

TEACHER EVALUATION LINEAR REGRESSION MODEL

$$eval = \beta_0 + \beta_1 \cdot av\_grad + \beta_2 \cdot stud\_att + \beta_3 \cdot class\_size + \beta_4 \cdot level$$
$$+ \beta_5 \cdot tv + \beta_6 \cdot hm + \beta_7 \cdot ht + \beta_8 \cdot se + \beta_9 \cdot sc + \beta_{10} \cdot sm$$

For this model the qualitative variables are defined as dummy or binary variables.

- Average grade (*av_grad*)
- Student attendence (*stud_att*)
- Class size (*class_size*)
- Level (*level*)
- If teacher contract type is full time (*tv=1*),
- If schedule is morning (*hm=1*),
- If schedule is afternoon (*ht=1*),
- If service is Engineering (*se=1*),
- If service is Science (*sc=1*),
- If service is Management and Economics (*sm=1*)

Estimation results

Results of teacher evaluation linear regression model estimated by OLS

Linear regression — Number of obs = 265; R-squared = 0.2262

eval	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
av_grade	-.0305093	.0527255	-0.58	0.563	-.134344	.0733255
stud_att	-.0013437	.0020803	-0.65	0.519	-.0054405	.0027531
class_size	.002505	.0019835	1.26	0.208	-.0014013	.0064112
level	-.0079032	.0158222	-0.50	0.618	-.0390627	.0232562
tv	.0030656	.0366971	0.08	0.933	-.0692038	.0753349
hm	.012384	.0414794	0.30	0.766	-.0693034	.0940713
ht	.0118858	.0409003	0.29	0.772	-.0686612	.0924328
se	-.1964094	.1086397	-1.81	0.072	-.4103587	.0175399
sc	.13917	.0987588	1.41	0.160	-.0553204	.3336603
sm	-.1000516	.0983374	-1.02	0.310	-.2937121	.093609
_cons	4.165332	.2209887	18.85	0.000	3.730128	4.600535

- The results are not statistically significant for any of the explanatory variables.
- Model fit: 22.62%

Estimation results

Considering a new model with only two explanatory variables: average grade (*av_grad*) and student attendence (*stud_att):*

$$eval = \beta_0 + \beta_1 \cdot av\_grad + \beta_2 \cdot stud\_att$$

Linear regression — Number of obs = 265

eval	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
av_grade	.0992548	.041581	2.39	0.018	.0173792	.1811303
stud_att	-.0032538	.0016229	-2.00	0.046	-.0064494	-.0000582
_cons	3.792122	.19099	19.86	0.000	3.416051	4.168193

This two variables are statistically significant

$\beta_1 \approx 0.1$ A one-unit increase in the average grade increases in teacher evaluation 0.1

$\beta_2 \approx 0.003$ A one-unit increase in the student attendence increases in teacher evaluation 0.003

New proposals

Implement a new linear regression model whose explanatory variables will be the results for each question of teacher evaluation.

Implement other models where the dependent variable won't be the complete result of teacher evaluation, but results for some questions of interest.

Make a cluster analysis to identify common characteristics among groups of teachers evaluated.

Thanks for your attention

QUESTIONS