Politecnico di Torino

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Analysis of the internship program of Politecnico di Torino

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Abstract

An internship is nowadays a good way for a young graduate to enter the world of work, an environment that is increasingly difficult to deal with and scale, due to the current situation that directly affects countries' economies.

Most universities offer the possibility for their students, undergraduates or not, to undertake an internship experience during the course of study. Students take up this opportunity to a large extent, 57.6% in Italy did this activity in 2020, as it emerges from the studies; they perceive the importance that this can have once their university career is over and it is interesting to see at the same time, how this can correlate with teaching.

In the following thesis work, an analysis of the internship programme of the Politecnico di Torino will be carried out, in particular for the Bachelor and Master's degree courses in Management Engineering.

After a first overview of the students of the above-mentioned courses, the role of practical traineeship in the career of each student will be investigated. In addition, in order to study the relationship between final grade and different variables characterizing the students, such as gender, age, being a trainee or not, etc., several statistical tests and linear regression analysis will be performed.

The results of study suggest that for bachelor graduates, the academic career (grades and years at graduation) is negatively correlated to the internship. Regarding the master's degree graduates, on the other hand, there seems to be no difference between the two groups, trainees and non-trainees, and a positive correlation between final degree grade and participation in the programme can be appreciated, although other factors considered better explain the grade.

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1 Introduction

In Italy, which at the end of 2019 was already showing a modest short-term employment dynamic compared with the eurozone average, in 2020 the economic impact brought about by the pandemic crisis due to Covid-19 has had a decisive impact of the economy and society, in line with that of other European partners, in the EU, GDP is estimated to decline by 6.4 percent compared to 2019 and in the euro area by 6.8 percent.

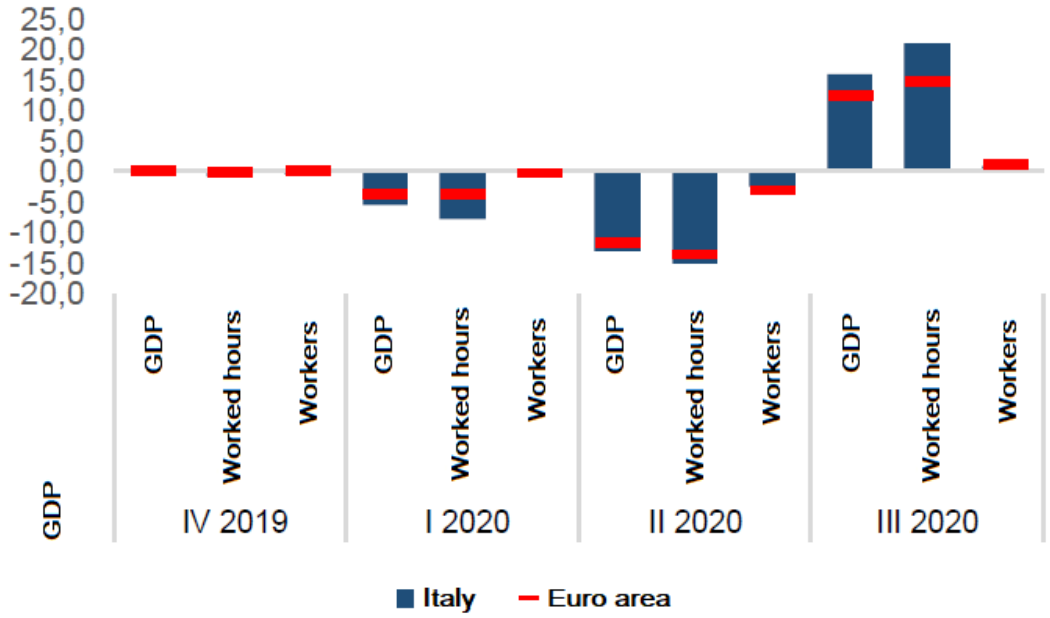


Image 1.1 - GDP, hours worked and employed. IV 2019-III 2020 (seasonally adjusted data, percentage changes) [Report Labour Market, Istat 2020]

The health emergency and the consequent suspension of the activities of entire productive sectors have represented a sudden and unprecedented shock on the production of goods and services and, consequently, on the labour market.

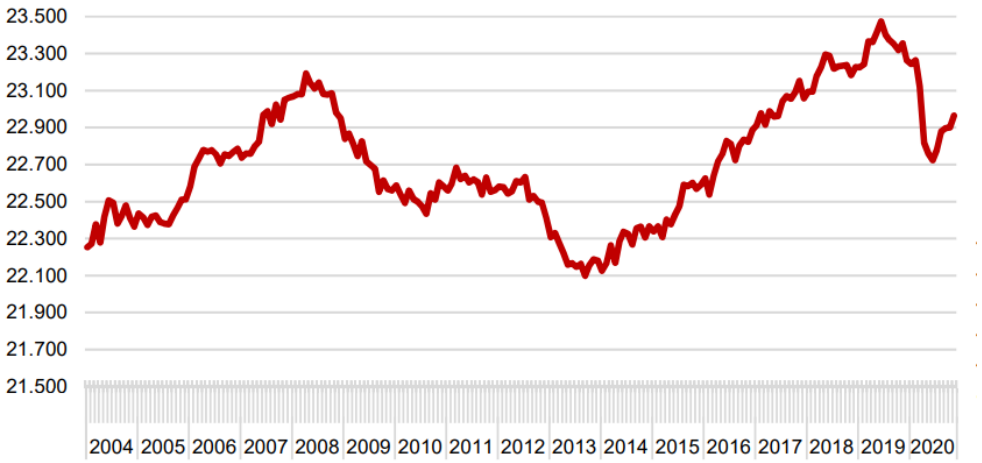


Image 1.2 - Number of employees from january 2004 to november 2020 (seasonally adjusted data, absolute values in thousands) [Report Labour Market, Istat 2020]

Domestic employment declined 2.4% in the second quarter of 2020 compared to the previous quarter and then rebounded 0.9% in the following quarter. Compared to the comparable quarters of 2019, the trend changes were -3.7% and -2.4% for the second and third quarters, respectively.

The number of people left without work is considerable, especially because of the termination of non-renewed fixed-term contracts and the termination of the contracts of new hires in a generalized climate of "suspension" of activities, including that of job search.

What distinguishes the Italian case is undoubtedly the early start, as early as the first quarter, of the economic decline in hours worked, accompanied by the subsequent more drastic reduction in the second quarter (down 15.1%), which is more in line with that of other countries. However, the subsequent rebound in the third quarter (up 21%) was not sufficient to close the gap with the corresponding period of the previous year (down 5.2%).

In both the euro zone and Italy, the negative effects on hours worked induced by the pandemic crisis are unprecedented: in the first three quarters of 2020 in the euro zone the overall reduction in hours worked compared to the first nine months of 2019 was in absolute terms almost double that recorded in 2009 compared to 2008 (in the first year of the "great recession" of the new century), and in Italy about 2.5 times larger.

As of November 30, there were about 51 thousand fewer job positions than in the first eleven months of 2019. The categories most penalized by the health emergency were those already previously characterized by situations of disadvantage: in the second quarter of 2020, the reductions in the employment rate are more pronounced for young people 15-34 years old, women and residents of the South.

In Italy the youth unemployment rate has risen further from an already very high level of 28.7%, reaching 33.8% in January 2021: this is what is stated in the sheet dedicated to Italy in the OECD (Organization for Economic Co-operation and Development), employment outlook young people have been particularly affected by the ravages of the crisis linked to Coronavirus.

The organization confirms that in OECD countries, hours worked by young people have fallen by almost twice the decline observed among adults and older people. The OECD points out that many young people, often employed in difficult sectors with precarious contracts have lost their jobs, while those who were about to enter the labour market after completing their studies have struggled to find work in a context of limited vacancies.

Thanks to the data reported by AlmaLaurea, the impact of the pandemic on recent graduates is clear: in 2020, the employment rate (which includes those who are engaged in paid education) is 69.2 percent among first-time graduates one year after graduation and 68.1 percent among second-time graduates in 2019.

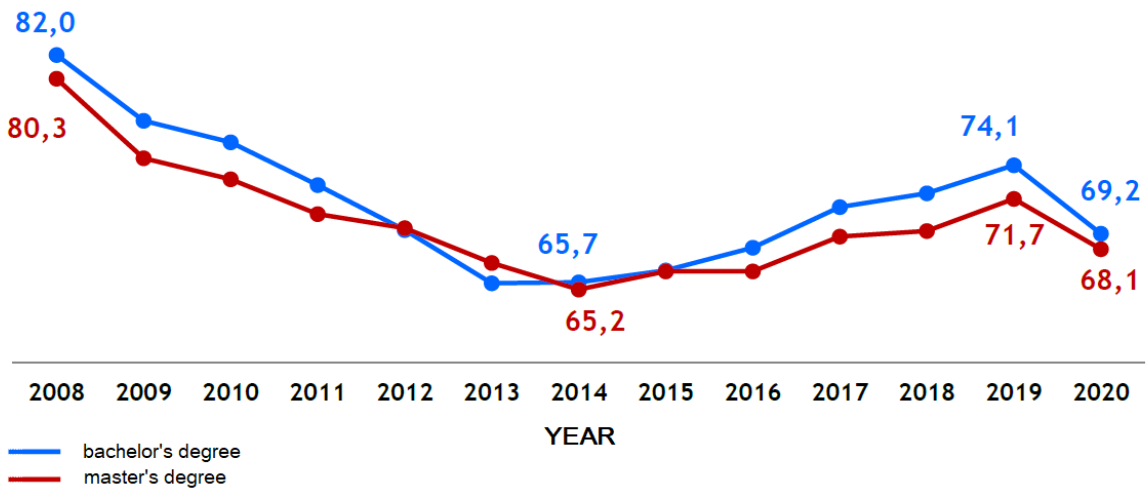


Image 1.3 - Graduates of the years 2007-2019 interviewed one year after graduation: employment rate by type of course. Years of survey 2008-2020. (percentage values). [Report AlmaLaurea,2021]

Compared to what was observed in the previous survey, in fact, in 2020 the employment rate decreased by 4.9 percentage points for first-level graduates and by 3.6 points for second-level graduates. Excluding graduates from the medical/healthcare and pharmaceutical groups, among graduates from January-June 2019, surveyed in spring 2020, the employment rate is 63.9% for first-level graduates and 68.6% for second-level graduates. These values are down sharply by 7.1 and 2.4

percentage points, respectively, from the employment rate, surveyed in 2019, (which was 71.0% among both bachelor's and master's graduates). Among July-December 2019 graduates contacted in the fall of 2020, the employment rate drops further, but to a significantly smaller extent: it is 62.4% for first-level graduates and 67.1% for second level graduates This sharp contraction comes after several years during which there has been a slow, but steady, recovery in the absorption capacity of the labour market.
Rather than the quality of work performed, the pandemic seems to have affected primarily the chances of finding employment. In fact, the net monthly salary one year after graduation is in 2020, on average, 1.270 euros for first-level graduates and 1.364 euros for second-level graduates. Compared to the 2019 survey, there is an increase: +5.4% for first-level graduates and +6.4% for second-level graduates.
In 2020, one year after obtaining a degree, the most common form of contract is non-standard employment, mainly on fixed-term contracts, which affects more than one-third of the employed. More than half of the employed, one year after graduation, consider the degree "very effective or effective" for the performance of their work.

This dissertation will explore the path of introduction of new graduates to the world of work through internship experiences, the role of internships in academia, and the correlation with college and teaching careers.

AlmaLaurea reports that an internship and guidance experience carried out and recognised by the degree course or a study experience abroad are trump cards to play on the labour market: all things being equal, in fact, those who have carried out a curricular internship are 12.2% more likely to be employed one year after obtaining their degree than those who have not carried out this type of activity.

In the first chapter, literature articles on curricular internships and how an internship influences entry into employment, will be analysed.
In the second chapter the focus will be on the Politecnico di Torino and data on graduates from the three-year and master's degree programmes in management engineering, statistic and graph will be analysed. Thanks to Politecnico archive, dates of 4050 graduating students from 2016 to 2021 will be studied to provide information such as how many males or females over the years, age at graduation, academic career and focus on internships.
In the third chapter, the results of the t-tests carried out trainees and non-trainees will be reported. The aspects the tests focus on are a comparison of average grades, graduation grade and graduation age in the two samples.

In the fourth chapter, a regression analysis will be carried out on the degree mark and several independent variables.
In the last chapter the final considerations and observations that can be deduced from the dissertation will be reported.

2 Internship and labour market

The AlmaLaurea Inter-University Consortium presents the 2021 Reports on the Profile and Employment Situation noting that 57.6% of graduates have completed curricular internships or work placements recognised by their degree course. In 2010 they were 56.8% but, after a few years of substantial stability, from 2015 there was a steady increase until 2019 (bringing this share to 59.9%), followed by a contraction in 2020. In detail, 57.3% of first-level graduates, 50.2% of single-cycle master's degree graduates and 61.7% of two-year master's degree graduates have carried out internships, as shown in the following image.

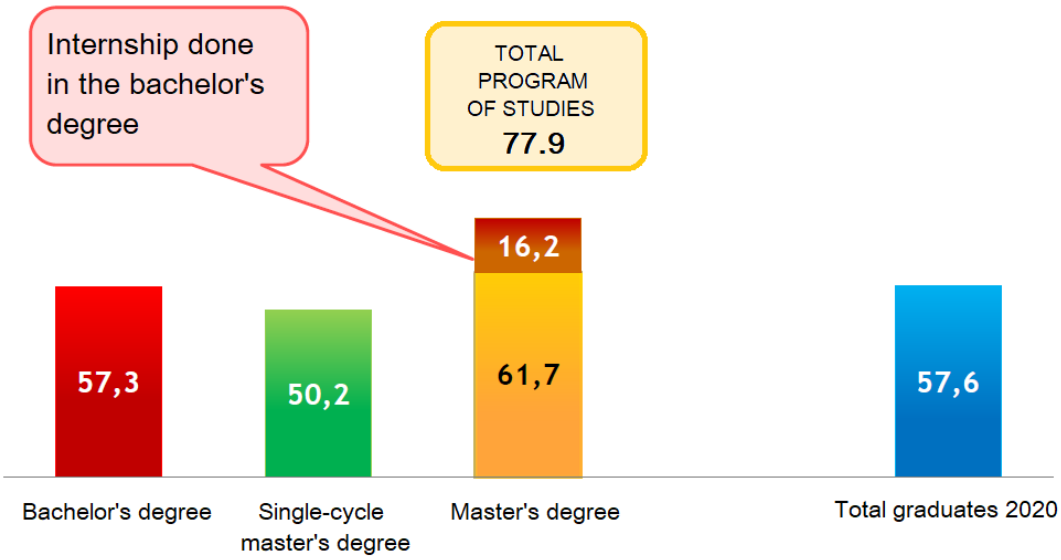


Image 2.1 - 2020 graduates: curricular internship activities recognized by the degree program by type of course (percentage values) [Report AlmaLaurea,2021]

University internships are a particular type of university-industry relationship that has gained increasing popularity among students, universities, governments, and companies. Since the implementation of the Bologna reform in Europe, which stems from the 1999 Bologna process during which there was an international reform process of higher education systems in the European Union that aimed to achieve the 'European Higher Education Area' by 2010, i.e. the result of the series of agreements at ministerial level and the related political and institutional activities that characterise the European dimension of higher education policy, there is a growing concern about the professional integration of graduates and the use of strategies that facilitate the university-work transition.

Several studies highlight the benefits of internships on the development of interpersonal and technical skills (Kinash et al., 2016) and the generation of realistic expectations when students face their first job.

Students who complete internships typically report higher salaries and greater job satisfaction. Internships also improve workplace adaptability, ability to play in a team, professionalism, communication skills and career potential. Entering the labour market is a long and gradual process that coincides with the period in which the individual manages to start a certain professional career. Therefore, it can be assumed that internships are an effective tool to improve job opportunities.

Graduate employability is now considered as an important criterion in the ranking systems of higher education institutions. High graduate employment rates are used to promote the university and attract new students. The employability performance of higher education institutions also influences the level of funding they receive in some countries, including Italy, the Czech Republic, Finland, Greece and Slovakia.

These examples illustrate the increasing importance of graduate employability in universities, which is now considered one of their main objectives. To achieve this goal, it is crucial for higher education institutions to minimise the existing gaps between campus and industry. This can be done by providing teachers with non-technical training (transversal competences), so that they in turn can transfer this knowledge to their students.

Although many higher education institutions are already interested in integrating transversal skills into the curricula, the success of this integration is not yet reflected in increased employability of graduates. In fact, many employers report that graduates are not job-ready and lack the skills needed for the labour market.

Employers are increasingly emphasising the importance of soft skills during the selection process of new workers, especially recent graduates. For example, in a study by the Confederation of British Industry (Roddis and Morgan, 2008), 86 per cent of respondents said that skills and attitudes were at the top of their list of priorities, while only 32 per cent considered the final grade of their degree to be relevant, and only about 10 per cent were concerned about the university candidates they had attended. It is argued that teachers are more interested in specialised and scientific teaching associated with their research interests (hard skills) and that this may lead to the neglect of soft skills and a strengthening of the mismatch between supply and demand in the labour market.

Therefore, in order to avoid a one-size-fits-all view on curriculum development, new mechanisms need to be developed to allow a regular exchange of information between stakeholders.

Several studies relate university curricula and employability to university careers. In the rest of chapter, the literature will be analysed, and the results reported.

The authors *(*Elisabeth T. Pereira et al., 2020) explore measures perceived by key European stakeholders (student, academic, employers) as crucial for the development of curricula that provide graduates work-life competences and key skills that can enhance their employability. These were achieved through the application of 1734 questionnaires to key stakeholders in five European countries: Greece, Spain, Portugal, Latvia and Poland. The most popular measure identified by all stakeholders was the internship. In particular, internships are considered of great importance to increasing the employability of graduates, as well as being the best means of cooperation between universities and enterprises. Higher education institutions should invest mainly in the creation of partnerships with companies in order to provide internships for students and invite professionals to participate in their pedagogical activities (curricular and/or extracurricular). This can be done by developing courses or debates to discuss skills and market needs, as well as by developing opportunities for employers to show their and talk about their experiences.

Other authors, (Gisela Di Meglio, et al., 2020) investigate instead whether curricular and voluntary traineeships improve the job attainment of Spanish graduates.

Students can engage in university internships for several reasons. Firstly, according to human capital theories (Becker,1964; Mincer,1974), internships allow for the development of skills not provided at university. Practical knowledge gained through practical experience can be a form of human capital that complements the skills gained during higher education.

Since the accumulation of knowledge improves individual productivity, this should be reflected in higher salaries, at least at the beginning of the professional career.

The effects of traineeships were examined mainly in three countries: the United States (US), Portugal and German. In the United States, Gault et al. (2010) found that university students with internship experience are offered more full-time job opportunities and earn higher starting salaries. For the German case, the results on the impact of traineeships on job performance are less conclusive than for the American and Portuguese economies.

The research examines whether traineeships can improve labour market performance using the first survey of graduate employment in Spain. This performance is understood in a broad sense, encompassing both matching (the adequacy of education and field of study to the job of graduates) and the characteristics of employment. Results show that traineeships open the door to the labour market, but there is weak evidence that they build a bridge to long-term integration in terms of adjustment or wages.

Traineeships facilitate the university-work transition for Spanish graduates as they reduce the time needed to find the first job and increase the probability of a good match between the area of study and the skills and the first job. The increased speed in job search can be largely explained by the fact that graduates continue in the same company after the end of their internship.
However, there is no clear evidence of an effect on matching with employment four years after graduation. Furthermore, there is no effects on wages in the medium/long term.

Despite of the points of view offered by the different authors, internships are clearly an important element in the training process of university students, aimed at enriching their education and completing their theoretical learning. In this sense, García Delgado (2009) mentions that internships allow the student to apply the academic knowledge acquired during the degree in a real context, as well as allowing the student to be part of a different context from the university.

Now, focusing on Politecnico di Torino, like other universities, enables its students to undertake an internship experience for both bachelor and master's degrees.
Activities, as described by University Carrier Service Office, carried out during the internship have a strong professional content and allow the student, in addition to the application of the knowledge acquired, a direct knowledge of the conditions of the world of work, the acquisition of greater autonomy of judgement and a refinement of the ability to work in a team. Organisations hosting trainees are municipalities, provinces, regions, public-private organisations, associations, and professional firms.
Politecnico di Torino offers the possibility of undertaking a traineeship instead of one or two equivalents, or nearly so, subjects in terms of CFUs and corresponding hours.
The internship is typically associated with the thesis at the master's degree level.
Student can consult an online portal with internship at any time and apply for them. In addition, the university organises days dedicated to meetings between firms and student in which they can find out about internship directly from the various companies, leave their CVs, or go an interview.

It is possible to undertake an internship abroad, thanks to the Erasmus + Traineeship grants awarded by the Politecnico. Each student can propose an internship location of their own choice or choose from a list of proposals provided by the university.
It also possible thanks to Politecnico participate in carrier guidance session for students, organised in collaboration with companies, institutions, and professionals in the sector to acquire a series of useful tools to face the world of work in a more conscious way, effectively presenting skills and competences, but also a cue to deepen some key transversal competences and to better understand the role of the engineer in specific sectors.

In the following chapters, the study will focus on Management Engineering students at Politecnico di Torino.

3 Data analysis, statistics, and graphs

Thanks to the archives of the Politecnico di Torino, data on the last six years of Management Engineering degrees have been retrieved.

Specifically, these data refer to 4050 graduates from 2016 to 2021 at both bachelor's and master's degrees and shall contain the following information in anonymous form:

- Years of graduation and enrolment
- Graduation grade and grade point average
- Year of birth, gender, place of birth
- If he/she has done an internship, how many hours and where the internship was done

In the following sub-chapters, the data analysis carried out is reported, to give an overview of a typical graduate in Management Engineering (age, gender) and their academic career, focusing on the aspect of internships. Using graphs and tables, a summary of the analysis will be reported with some comments when a trend is clearly visible or when it is consistently confirmed year by year by the analysed data.

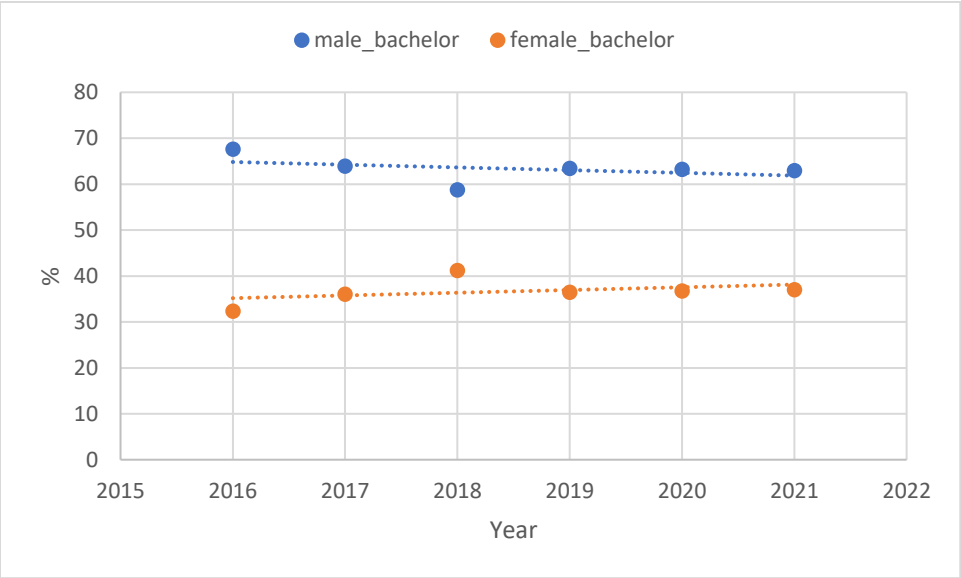
3.1 Gender distribution

For what concerns bachelor's degree graduates, the numbers of males and females and the percentages in relation to the total number of graduates compared to the reference year are shown in the table below.

Bachelor's degree	Year	Total	Male	Female	% Male	% Female
	2016	244	165	79	68	32
	2017	283	181	102	64	36
	2018	381	224	157	59	41
	2019	408	259	149	63	37
	2020	430	272	158	63	37
	2021	135	85	50	63	37

Table 3.1.1 – Gender graduates' distributions for bachelor's degree in Management Engineering

As can be seen from Graph 3.1.1, the percentages of males or females are almost constant over the last six-year bachelor's degree graduates.

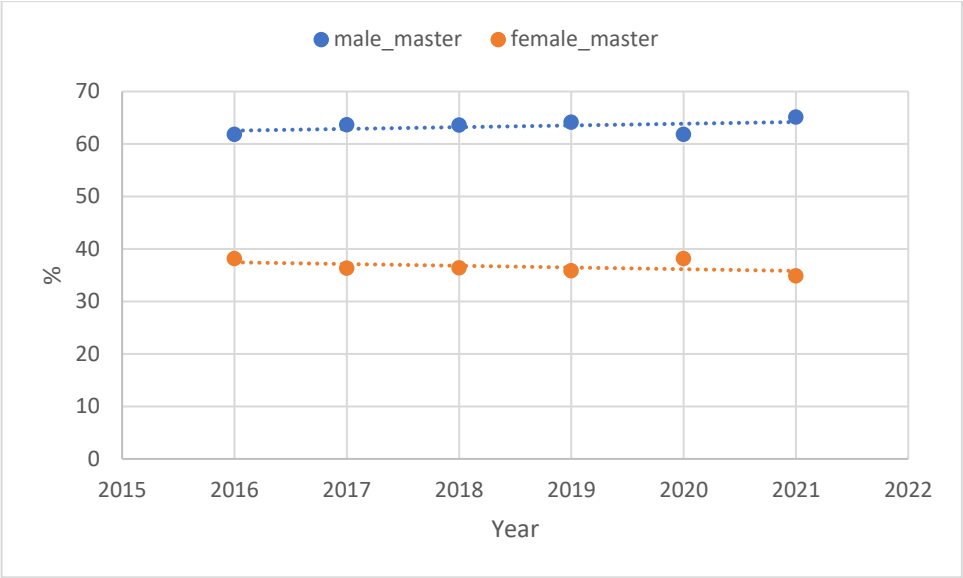


Graph 3.1.1 – Male and female percentages in bachelor's degree graduates

For master's graduates, the result of the analysis is reported in Table 3.1.2. Also in this case, as shown in graph 3.1.2, the percentage distribution of males and females in the graduates is almost the same in the different academic years analysed.

Master's degree	Year	Total	Male	Female	% Male	% Female
	2016	304	188	116	62	38
	2017	333	212	121	64	36
	2018	357	227	130	64	36
	2019	427	274	153	64	36
	2020	487	301	186	62	38
	2021	261	170	91	65	35

Table 3.1.2 – Gender graduates' distributions for master's degree in Management Engineering



Graph 3.1.2 – Male and female percentages in master's degree graduates

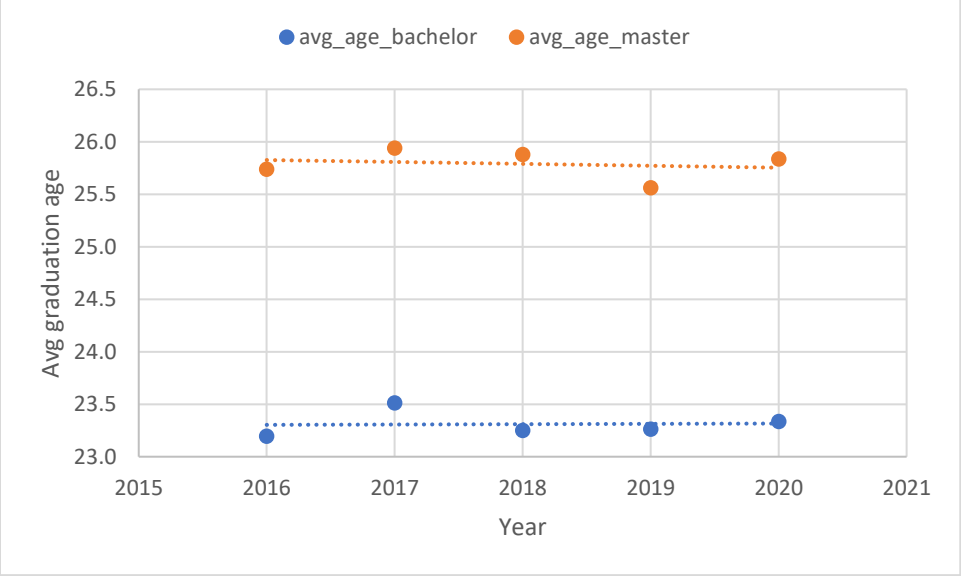
3.2 Average graduation age

The average graduation age is calculated for each academic year and reported, separately for bachelor and master's degrees, in the table 3.2.1.

Bachelor's degree	Year	Total	Avg graduation age
	2016	244	23.2
	2017	283	23.5
	2018	381	23.2
	2019	408	23.3
	2020	430	23.3
	2021	135	24.2
Master's degree	**Year**	**Total**	**Avg graduation age**
	2016	304	25.7
	2017	333	25.9
	2018	357	25.9
	2019	427	25.6
	2020	487	25.8
	2021	261	26.0

Table 3.2.1 – Average graduation age in bachelor's and master's degree graduates

In the graph 3.2.1 it is possible to see how the average graduation age is almost the same in the last five years considered.



Graph 3.2.1 – Average graduation age in bachelor's and master's degree graduates

For what concerns the year 2021, data only refer to first graduation session in March, which usually collects all the students who are late for the regular summer and winter sessions of the previous year. For this reason, they should not be considered, and are not reported in the graph 3.2.1.

3.3 Internship

In the analysis, special attention was paid to internships and the characteristics of interns. In the following subsections, the results will be presented in terms of the number of interns for each academic year from 2016 to 2021, the number of hours completed and the geographical distribution of internships according to the origin of the interns.

3.3.1 Number of trainees

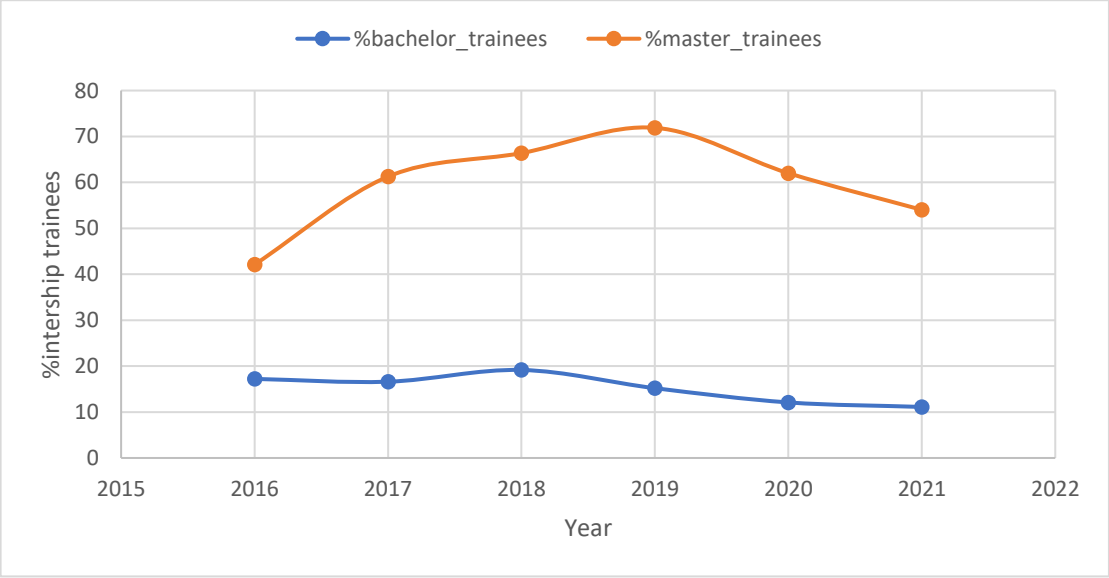
A first approach to the data on internships can be to calculate the percentage of graduates who choose this option each year.

The numbers and percentages of student trainees compared to the total number of graduates in that year are given in the following table.

Bachelor's degree	Year	Total	# Trainees	% Trainees
	2016	244	42	17
	2017	283	47	17
	2018	381	73	19
	2019	408	62	15
	2020	430	52	12
	2021	135	15	11
Master's degree	**Year**	**Total**	**# Trainees**	**% Trainees**
	2016	304	128	42
	2017	333	204	61
	2018	357	237	66
	2019	427	307	72
	2020	487	302	62
	2021	261	141	54

Table 3.3.1.1 – Number and percentages of trainee's student for bachelor's and master's degree.

In Figure 3.3.1.1, it can be seen that the Covid-19 pandemic has influenced the almost constant trend in 2020 and 2021 of first-level graduates and the increasing trend of second-level graduates. Forced remote working conditions and problems with insurance and liability drastically reduce the number of open positions for internships in many companies in the country.



Graph 3.3.1.1 – Percentages of trainees in bachelor's and master's degrees graduates.

3.3.2 Gender distribution in trainees

The number of male and female trainees for bachelor's and master's degree was analysed. The results are shown in the tables 3.3.2.1 and 3.3.2.2.

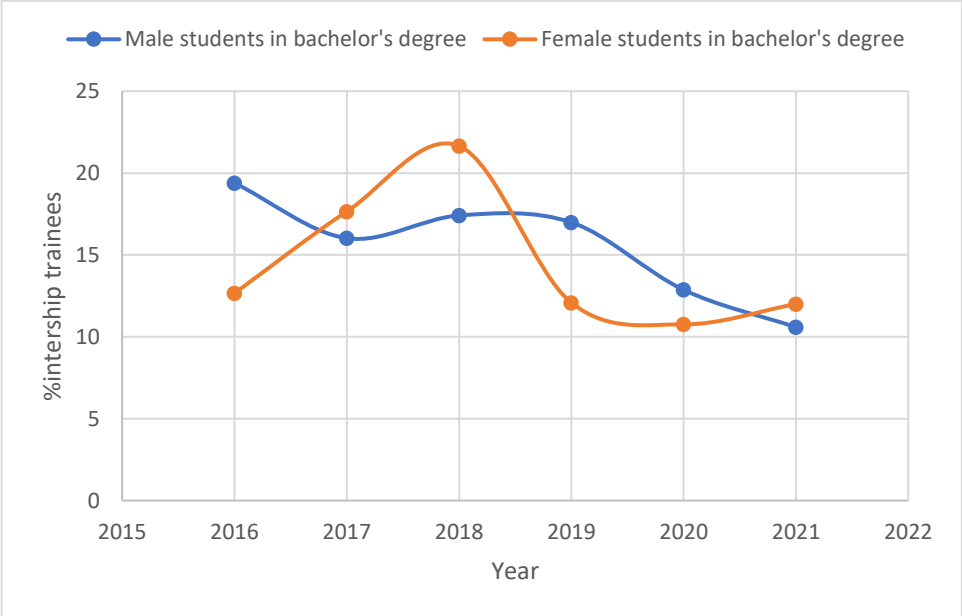
Male students in bachelor's degree	Year	Total	Internship trainees	% Trainees
	2016	165	32	19
	2017	181	29	16
	2018	224	39	17
	2019	259	44	17
	2020	272	35	13
	2021	85	9	11
Female students in bachelor's degree	**Year**	**Total**	**Internship trainees**	**% Trainees**
	2016	79	10	13
	2017	102	18	18
	2018	157	34	22
	2019	149	18	12
	2020	158	17	11
	2021	50	6	12

Table 3.3.2.1 – Gender distribution in trainees in bachelor's degree graduates

Male students in master's degree	Year	Total	Internship trainees	% Trainees
	2016	188	74	39
	2017	212	126	59
	2018	227	148	65
	2019	274	199	73
	2020	301	187	62
	2021	170	90	53
Female students in master's degree	**Year**	**Total**	**Internship trainees**	**% Trainees**
	2016	116	54	47
	2017	121	78	64
	2018	130	89	68
	2019	153	108	71
	2020	186	115	62
	2021	91	51	56

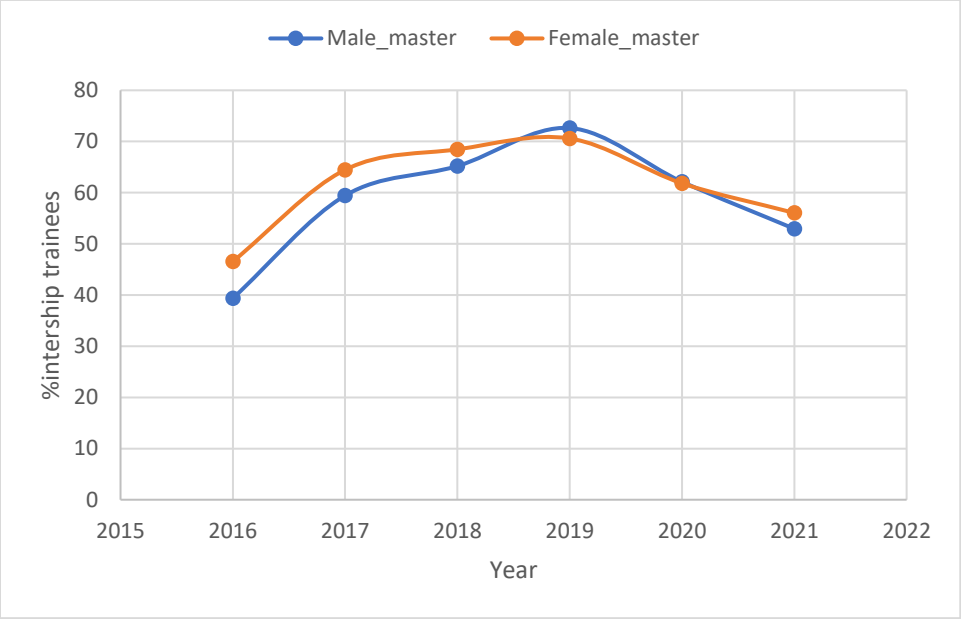
Table 3.3.2.2 – Gender distribution in trainees in master's degree graduates

For what concern bachelor's degree graduates, as it can be seen in the graph 3.3.2.1, the percentage of males and females are significantly different probably due to the low number of trainees and the few academic years considered.



Graph 3.3.2.1 – Gender distribution in trainees in bachelor's degree graduates

For master's degree students instead, the percentage of male and female students deciding to do a stage in their academic career are almost the same in the academic years considered.



Graph 3.3.2.2 – Gender distribution in trainees in master's degree graduates

3.3.3 Female trainees index analysis

The Glass Ceiling Index is an index create by The Economist in 2013 for the international women's day in 8th of march. It is an indicator that is updated annually by processing data from different organisations, such as the European Commission, the Organization for Economic Co-operation and Development and the International Labour Organization on topics such as schooling education, wages, maternity and paternity rights and other similar issues.

It is possible to compute a kind of GCI to analyse the participation of female students in the internship programme compared to male students. The formula of the index is reported below:

$$index_F = \frac{\frac{number\ of\ female\ trainees}{total\ number\ of\ trainees}}{\frac{number\ of\ female\ students}{total\ number\ of students}} = \frac{\%female\ trainees}{\%female\ students}$$

The results are reported in the tables 3.3.3.1 and 3.3.3.2 for bachelor's and master's degree graduates respectively.

Year	% Female trainees	% Female students	Index $_F$
2016	23.81	32.38	0.74
2017	38.30	36.04	1.06
2018	46.58	41.21	1.13
2019	29.03	36.52	0.79
2020	32.69	36.74	0.89
2021	40.00	37.04	1.08

Table 3.3.3.1 – Index F computation for bachelor's degree graduates

Year	% Female trainees	% Female students	Index $_F$
2016	42.19	38.16	1.11
2017	38.24	36.34	1.05
2018	37.55	36.41	1.03
2019	35.18	35.83	0.98
2020	38.08	38.19	1.00
2021	36.17	34.87	1.04

Table 3.3.3.2 – Index F computation for master's degree graduates

Observing the different value of the F-index in the academic years considered, a small increase of its value can be noticed in the undergraduate students. It seems to indicate that more female students tend to do an internship than male students, while for Bachelor graduates the situation is the opposite because fewer female students did an internship during their academic career.

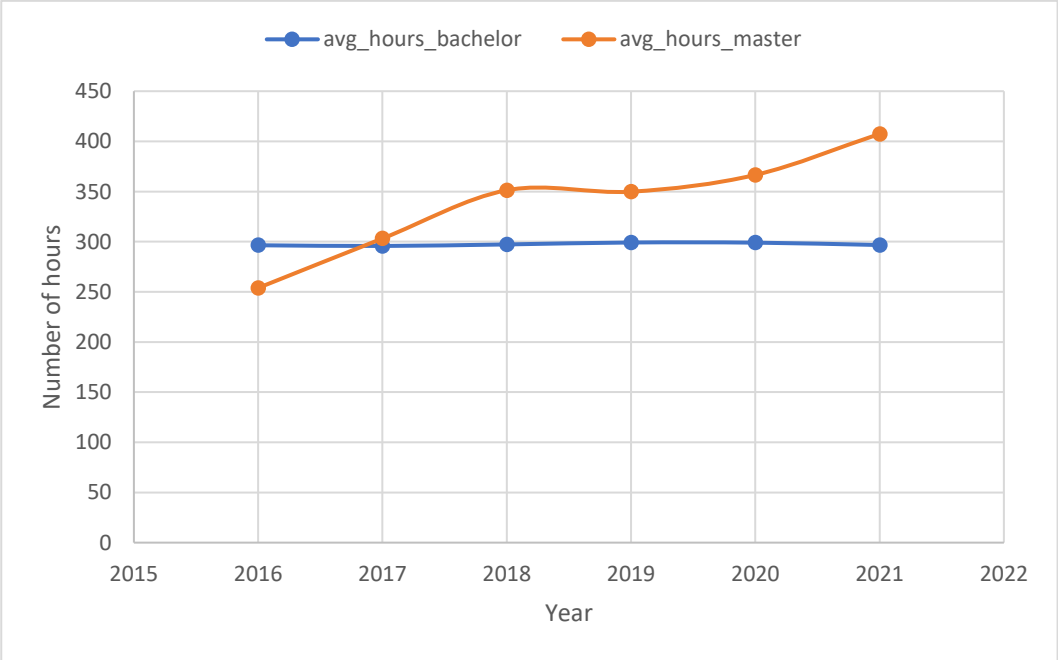
3.3.4 Number of hours

For each academic year analysed, it is possible to calculate the average number of hours each student spent in their internship experience. The results are shown in the following table.

Bachelor's degree	Year	Total	Internship trainees	Average internship hours
	2016	244	42	296
	2017	283	47	296
	2018	381	73	297
	2019	408	62	299
	2020	430	52	299
	2021	135	15	297
Master's degree	**Year**	**Total**	**Internship trainees**	**Average internship hours**
	2016	304	128	254
	2017	333	204	303
	2018	357	237	351
	2019	427	307	350
	2020	487	302	367
	2021	261	141	407

Table 3.3.2.1 – Average number of hours of internship for bachelor's and master's degree graduates

As can be observed from the data reported in table 3.3.2.1 and chart 3.3.2.1, the hours are constant for internships for bachelor's degree graduates, while in the last six academic years considered the hours used for an internship during master's degree have increased considerably.



Graph 3.3.2.1 - Average number of hours of internship for bachelor's and master's degree graduates

3.3.5 National internship distribution

Another type of analysis that can be made concerns the geographical distribution of traineeships in relation to their origin.

A first approach can be to distinguish Italian from foreign trainees, data are reported in table 3.3.5.1 for bachelor's degree graduates.

Year	Total	Internship trainees	Italians	Foreigners
2016	244	42	40	2
2017	283	47	45	2
2018	381	73	69	4
2019	408	62	61	1
2020	430	52	49	3
2021	135	15	14	1

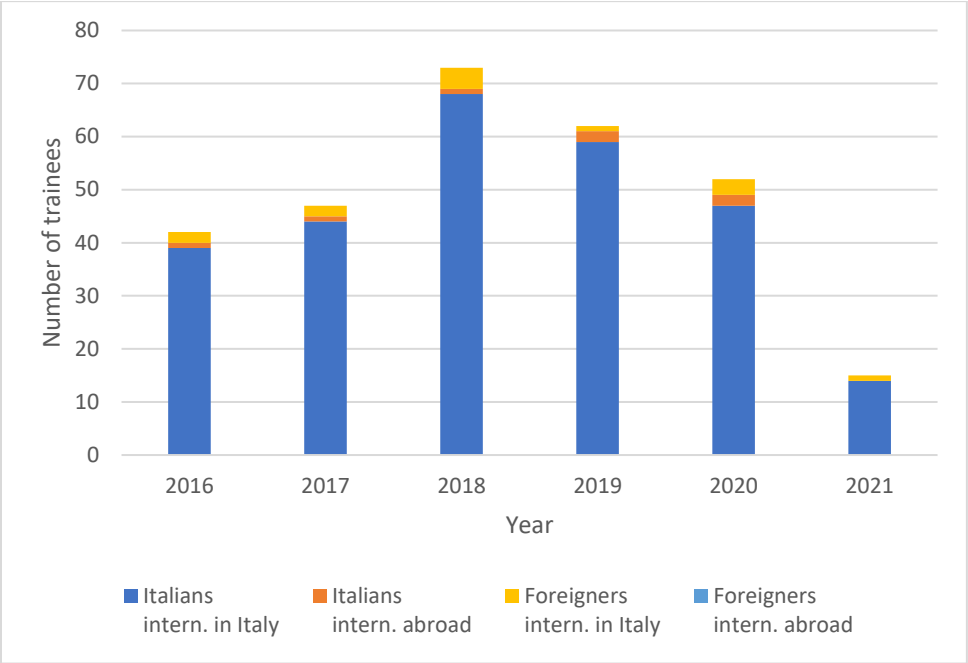
Table 3.3.5.1 – Italian and foreign trainees in bachelor's degree graduates

Then, one can distinguish where the Italian students did their internship, whether abroad or in Italy, and the same for the other students. The results are reported in table 3.3.5.2.

Year	Italians trainees in Italy	Italians trainees abroad	Foreigners trainees in Italy	Foreigners trainees abroad
2016	39	1	2	0
2017	44	1	2	0
2018	68	1	4	0
2019	59	2	1	0
2020	47	2	3	0
2021	14	0	1	0

Table 3.3.5.2 – Geographical distribution of internships for Italian and international students in bachelor's degree graduates.

As can be seen in the graph 3.3.5.1, the number of international students who have done an internship is very low compared to Italian students and the most representative column in the graph is that of Italian students who have done an internship in Italy. In addition, almost none of both Italian and international graduate students did an internship abroad.



Graph 3.3.5.1 - Geographical distribution of internships for Italian and international students in bachelor's degree graduates.

The same analysis can be made for master's degree graduates. The situation, as reported in table 3.3.5.3 and 3.3.5.4, is slightly different.

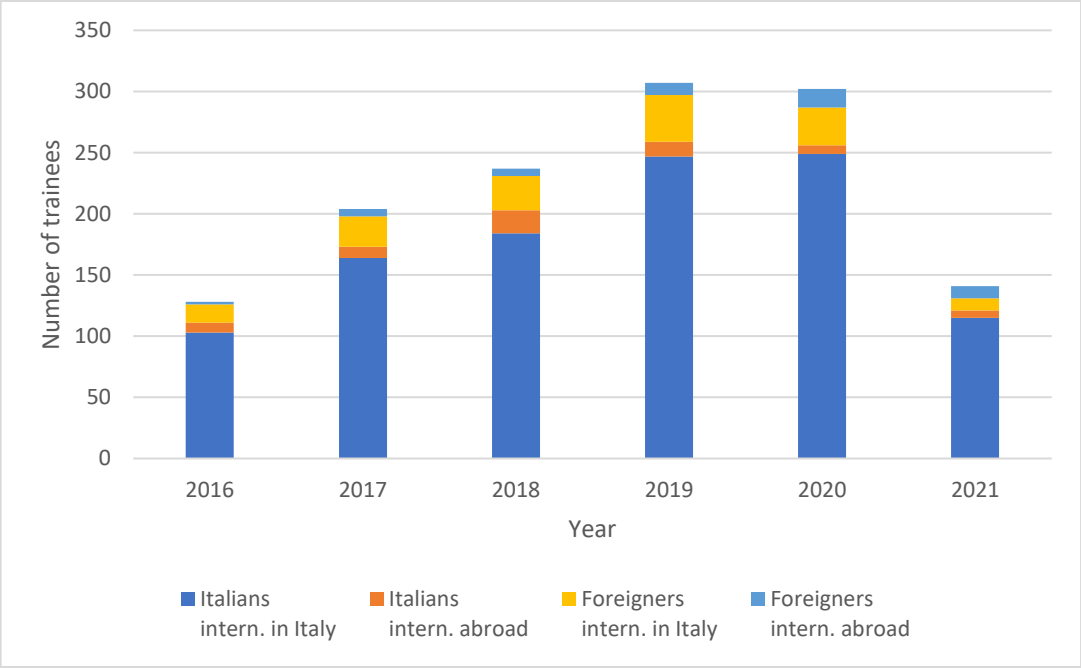
Year	Total	Internship trainees	Italians	Foreigners
2016	304	128	111	17
2017	333	204	173	31
2018	357	237	203	34
2019	427	307	259	48
2020	487	302	256	46
2021	261	141	121	20

Table 3.3.5.3 – Italian and foreign trainees in master's degree graduates

Year	Italians trainees in Italy	Italians trainees abroad	Foreigners' trainees in Italy	Foreigners' trainees abroad
2016	103	8	15	2
2017	164	9	25	6
2018	184	19	28	6
2019	247	12	38	10
2020	249	7	31	15
2021	115	6	10	10

Table 3.3.5.4 – Geographical distribution of internships for Italian and international students in master's degree graduates.

As shown in graph 3.3.4.2, there are slightly more international students in the Master's degree graduates than in the Bachelor's degree graduates. However, even in this case the column most represented in the graph is that of Italian students who did an internship in Italy.



Graph 3.3.5.2 - Geographical distribution of internships for Italian and international students in master's degree graduates.

3.3.6 Regional internship distribution

As in the previous subchapter, the same type of analysis can be done by considering which students come from Piedmont or not, and how many of these graduates did an internship in Piedmont or not.

Starting from bachelor's degree graduates, the number of students from and outside Piedmont is shown in table 3.3.6.1.

Year	Total	Internship trainees	Piedmonteses	Not Piedmonteses
2016	244	42	18	24
2017	283	47	23	24
2018	381	73	42	31
2019	408	62	35	27
2020	430	52	31	21
2021	135	15	9	6

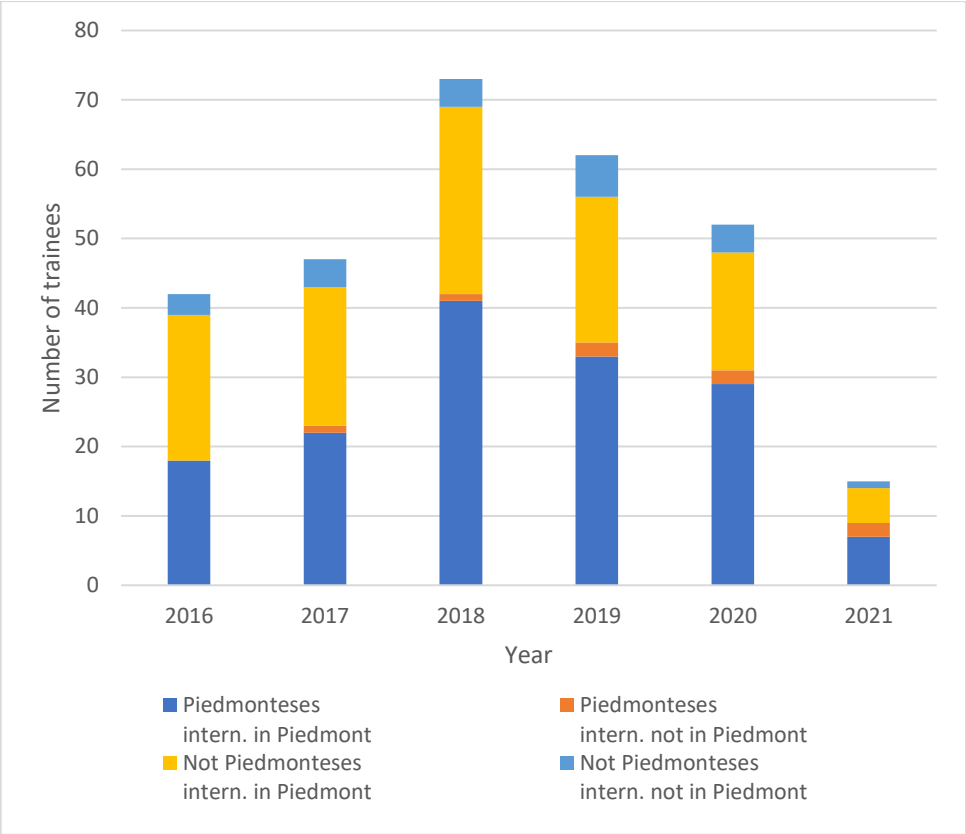
Table 3.3.6.1 – Piedmonteses or not trainees in bachelor's degree graduates

Then, one can distinguish as done in the subchapter 3.3.5 where students coming from Piedmont did their internship, whether in Piedmont or not, and the same for the other students. The results are reported in table 3.3.6.2.

Year	Piedmonteses intern. in Piedmont	Piedmonteses intern. not in Piedmont	Not Piedmonteses intern. in Piedmont	Not Piedmonteses intern. not in Piedmont
2016	18	0	21	3
2017	22	1	20	4
2018	41	1	27	4
2019	33	2	21	6
2020	29	2	17	4
2021	7	2	5	1

Table 3.3.6.2 – Geographical distribution of internships for Piedmontese and interregional students in bachelor's degree graduates.

As can be seen from the data reported in the table above and in graph 3.3.6.1, most students did an internship in Piedmont even if they came from Piedmont or not.



Graph 3.3.6.1 - Geographical distribution of internships for Piedmontese and interregional students in bachelor's degree graduates.

The same analysis can be done for master's degree graduates. The situation, as reported in table 3.3.6.3 and 3.3.6.4, is almost the opposite of what was found for bachelor's degree graduates.

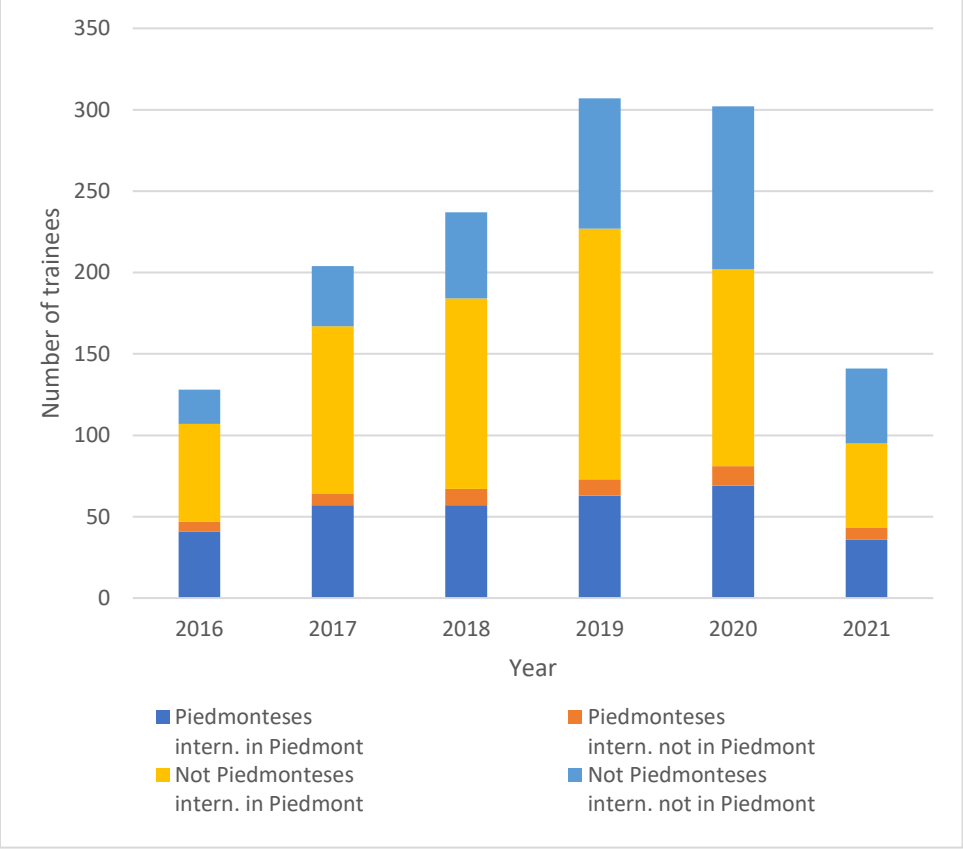
Year	Total	Internship trainees	Piedmonteses	Not Piedmonteses
2016	304	128	47	81
2017	333	204	64	140
2018	357	237	67	170
2019	427	307	73	234
2020	487	302	81	221
2021	261	141	43	98

Table 3.3.6.3 – Piedmontese and interregional trainees in master's degree graduates

Year	Piedmonteses intern. in Piedmont	Piedmonteses intern. not in Piedmont	Not Piedmonteses intern. in Piedmont	Not Piedmonteses intern. not in Piedmont
2016	41	6	60	21
2017	57	7	103	37
2018	57	10	117	53
2019	63	10	154	80
2020	69	12	121	100
2021	36	7	52	46

Table 3.3.6.4 – Geographical distribution of internships for Piedmontese and interregional students in master's degree graduates.

Most students are not from Piedmont, so as can be seen from graph 3.3.6.2 the preponderant part of the internships is represented by interregional students who decided to do a stage in Piedmont or outside of the Piedmont, in contrast to the bachelor's degree graduates where the majority of internships are represented by Piedmontese students who did a stage in their region.



Graph 3.3.6.2 - Geographical distribution of internships for Piedmontese and interregional students in master's degree graduates

4 T-test analysis

The t-test is a parametric statistical test whose aim is to check whether the mean value of the distribution is significantly different from a certain reference value. The main difference with other types of statistical tests, such as the z-test, is that the variance σ2 is unknown.

A problem that usually requires the application of a t-test is the comparison of two mean values computed from two samples of a certain population. The t-test tries to answer the question whether the difference between the two mean value is significant or not.

The steps to execute the test are as follows:

- Collect quantitative data
- Compute the two mean values of the two samples
- Compare the two mean values using the t-test
- Their difference is significant or due to chance?

To compare the two mean values the starting hypothesis is that the difference is due to chance. The result of the t-test is to accept or to reject the hypothesis.

The formula to compute the t value is

$$t = \frac{m_1 - m_2}{S} \sqrt{\frac{N_1 N_2}{N_1 + N_2}}$$

where m are the mean values of the two samples, S is the standard deviation, obtained by adding the deviation of the two samples and dividing by the sum of their degrees of freedom, and N are the numerical factors.

The t value is compared with the value of Student's t-distributions to determine whether the difference between the two mean values is due to chance or not. The result of this comparison is a p-number which can lead to three different scenarios:

- $p > 0,05$

The difference between the two mean values is not significant. The starting hypothesis is accepted.

- $0,01 < p < 0,05$

The difference between the two mean values is significant with a level of confidence of 95%. The starting hypothesis is rejected.

- $p < 0,01$

The difference between the two mean values is significant with a level of confidence of 99%. The starting hypothesis is rejected.

In the following subchapters will be reported the result of several t-tests that were calculated to check whether the difference between two samples of graduates from a certain population is significant or not.

In particular, the statistical test involved a sample of students who had done an internship during their academic career compared to another sample who had not done an internship. Aspects on which the tests focus are a comparison of average grades, graduation grade and graduation age in the two samples.

The calculation was performed using the t-test function of the spreadsheet in Microsoft Excel, setting as options the two-tailed distribution and the homoschedastic type because a homogeneous variance of the data is assumed.

4.1 T-test I – average grades

The starting hypothesis of the T-student test is that there is no significant difference in the average grade of a student who has done an internship during his or her academic career and another who has not. Several tests were performed considering the average grade of the two samples (trainee and non-trainee students) for each academic year from 2016 to the first graduation session in 2021.

The results are reported in table 4.1.1 for bachelor's degree and in table 4.1.2 for master's degree graduates.

Year	Average grade Trainees	Average grade Not trainees	p (sign. level)
2016	22.61	22.99	0.263
2017	22.41	22.88	0.102
2018	22.66	23.14	0.040
2019	22.51	23.31	0.003
2020	22.50	23.24	0.009
2021	21.90	22.51	0.097
Total	22.51	23.09	0.0000008

Table 4.1.1 – Average grade in trainee and not trainee students and t-test results for bachelor's degree graduates.

Year	Average grade Trainees	Average grade Not trainees	p (sign. level)
2016	24.93	24.67	0.323
2017	25.00	25.21	0.386
2018	25.00	25.16	0.501
2019	25.32	25.58	0.240
2020	25.06	25.72	0.001
2021	25.32	25.51	0.433
Total	25.12	25.30	0.051

Table 4.1.2 – Average grade in trainee and not trainee students and t-test results for master's degree graduates.

In the last rows of tables 4.1.1 and 4.1.2 the t-tests that consider all graduates of all academic years considered for the bachelor and master's degree respectively are also reported. In the tables the t-tests that lead to the rejection of the starting hypothesis and that have at least a significance level of 95% are also highlighted in red.

What can be noticed is that for what concern bachelor's degree graduates, the difference between the two mean values is significant. Excluding the year 2021, which may lead to wrong consideration due to poor representation of graduates from that year (only the first graduation session is considered), a statistically significant difference can be observed: the average marks of students who did an internship are lower than those who did not.

The same observation cannot be done for master's degree graduates who do not obtain this condition from the results shown in the table above.

4.2 T-test II – average graduation vote

The same considerations made in the previous sub-section can be applied to graduation grades, on which t-tests can be calculated to check whether the difference between the mean values of the graduation grade has statistical significance if a student has or has not done an internship.

The results are reported in table 4.2.1 for bachelor's degree and in table 4.2.2 for master's degree graduates.

Year	Avg graduation vote Trainees	Avg graduation vote Not trainees	p (sign. level)
2016	89.50	90.79	0.338
2017	88.49	90.40	0.087
2018	89.48	91.47	0.030
2019	88.66	92.06	0.0009
2020	88.67	91.76	0.004
2021	85.87	88.98	0.037
Total	88.82	91.23	0.0000002

Table 4.2.1 – Average graduation vote in trainee and not trainee students and t-test results for bachelor's degree graduates.

Year	Avg graduation vote Trainees	Avg graduation vote Not trainees	p (sign. level)
2016	97.80	96.69	0.267
2017	98.38	98.71	0.726
2018	98.10	98.94	0.354
2019	99.42	100.28	0.298
2020	98.30	100.73	0.002
2021	99.28	100.11	0.374
Total	98.59	99.18	0.100

Table 4.2.2 – Average graduation vote in trainee and not trainee students and t-test results for master's degree graduates.

The results obtained are comparable to those in subchapter 4.2. For bachelor graduates, a statistically significant difference between the grade point averages can be observed. Students who did an internship obtain a lower grade than those who did not. For master's graduates the difference does not appear to be statistically significant.

The most significant result, as for average grades, is obtained when considering the set of bachelor graduates because the p-number is much lower than the 0.01 threshold for the 99% confidence level.

The difference between trainees and non-trainees in average grades or grade for graduates can be explained by the alternative subject to be done instead of the internship. It might help to increase a student's grade point average, whereas internships give the same number of academic credits (CFU), but no grade is given, so the average grades remain the same. Therefore, the grade of these subjects might be higher on average than the others, but this cannot be verified because these data are not present in the database of graduates used.

4.3 T-test III – average graduation age

The last tests carried out concern the average age of graduation, testing whether there is a statistically significant difference between graduates who have done an internship or not. The starting hypothesis is that the difference is due to chance.

The average graduation age of trainee and not trainee students and t-test results for bachelor's and master's degree graduates are reported respectively in table 4.3.1 and 4.3.2.

Year	Average graduation age Trainees	Average graduation age Not trainees	p (sign. level)
2016	23.17	23.20	0.895
2017	23.89	23.44	0.200
2018	23.77	23.13	0.0006
2019	23.47	23.22	0.236
2020	24.21	23.21	0.003
2021	25.13	24.11	0.025
Total	23.79	23.30	0.00003

Table 4.3.1 – Average graduation age of trainee and not trainee students and t-test results for bachelor's degree graduates.

Year	Average graduation age Trainees	Average graduation age Not trainees	p (sign. level)
2016	25.45	25.94	0.011
2017	25.87	26.05	0.545
2018	25.80	26.03	0.377
2019	25.53	25.63	0.585
2020	26.01	25.55	0.006
2021	26.21	25.72	0.010
Total	25.81	25.81	0.975

Table 4.3.2 – Average graduation age of trainees and not trainees' students and t-test results for master's degree graduates.

The average age of graduation is higher in the master graduates of some academic years, but the opposite is also true in some of them. The tests carried out do not seem to show a significant difference between the two population samples.

For bachelor's graduates, as found in the previous sub-sections, this difference seems to be more evident: the graduation age of trainees seems to be statistically higher than that of non-trainees. This alternative hypothesis is tested in some academic years and in the test considering all graduates, which has the p value much lower than all other.

5 Multivariate regression model

The multivariate regression is a statistical technique that can be used to analyse the relationship between a dependent variable and others independent variables usually called predictors. The goal of this analysis is to predict the value assumed by the dependent variable from the knowledge of the values of the independent ones.

The multivariate regression model can be expressed as

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n + \varepsilon$$

where:

- y is the dependent variable
- n is the number of independent variables
- x_i is the i-th component of n independent variables
- β_i is the i-th coefficient of the n independent variables
- ε is the error

For the assumptions made, ε can be described by a random variable that it is normally distributed with mean equal to zero and constant variance.

By collecting m different observations, the above relationship can be rewritten in matrix form as follow

$$Y = X\beta + \varepsilon$$

where:

$$Y = \begin{bmatrix} y_1 \\ \cdots \\ y_m \end{bmatrix} \qquad \beta = \begin{bmatrix} \beta_0 \\ \cdots \\ \beta_n \end{bmatrix} \qquad X = \begin{bmatrix} 1 & x_{11} & \cdots & x_{1n} \\ \vdots & & \ddots & \vdots \\ 1 & x_{m1} & \cdots & x_{mn} \end{bmatrix} \qquad \varepsilon = \begin{bmatrix} \varepsilon_0 \\ \cdots \\ \varepsilon_n \end{bmatrix}$$

It is possible to estimates the vector of parameters β by computing the pseudo-inverse of the matrix X

$$\hat{\beta} = (X'X)^{-1}X'Y$$

The multivariate regression model can be applied to the data analysed in the third chapter. In particular, it will be studied the possibility to predicting the graduation grade (dependent variable) starting from several independent variable such as gender, graduation age, whether they have done an internship or not and others student characteristics.

R^2 and $\overline{R}^2$ (corrected R^2) indices will be used to evaluate the goodness of fit of the model. The linear determination index R^2 represents the variance of Y that can be explained by predictors X in the model. In the presence of a linear relationship this index is different from zero. Its value tends to increase as the number of regressors X increases, even though the new added regressors do not necessarily explain the relation with Y better. $\overline{R}^2$ corrects for this excess by a factor that increases with the number of regressor X used in the model.

The effectively existence of a link between dependent and independent variables is checked with Fisher's F-test, obtained from the ratio between the regression and model's dispersion variances. The assumption regarding the non- existence of this relationship is rejected by setting a significance level α, that in this case is equal to 0.05.

5.1 MR I – bachelor's degree graduates

The first multivariate regression model concerns only the bachelor's degree graduates. For this regression, the variables considered are as follows:

- Graduate grade as dependent variable y
- Four independent variables x: gender, graduation age, if he/she is a trainee or not, if he/she is Italian or not. Graduation age a part, the others are treated as binary variables.

The results obtained are reported in table 5.1.1.

	Coefficients	*Standard error*	*Stat t*	*Level of significance*
Intercept	132.190	2.204	59.984	0.0000
Gender (1=M, 0 = F)	-0.219	0.307	-0.715	0.4740
Graduation age	-1.794	0.082	-21.769	0.0000
Trainee (1 = yes, 0 = no)	-1.523	0.411	-3.710	0.0002
Italian (1 = yes, 0 = no)	1.009	0.817	1.236	0.2170

Table 5.1.1 – Multivariate regression model for bachelor's degree graduates

The independent variables have different levels of significance. The least significant are the gender and the nationality of the students, so their contribution to explaining the degree grade is lower than the others.

As for the others, two observations can be made. The first is that the negative coefficient of trainee variable confirms what was found early in the descriptive analysis and in the t-tests: doing an internship during the bachelor's degree instead of attending a free choice course decreases the graduation grade. The second is that the graduation age is the most significant contribution to predicting the graduation grade: the negative coefficient indicates that if the graduation age increases the vote decreases, showing a student's difficulty in passing all the exams to graduate earlier.

The goodness-of-fit indices of the model are reported in table 5.1.2. A relationship between the dependent and independent variables exists and it is confirmed by the significance of the F-test. The results obtained in terms of R^2 and $\overline{\mathrm{R}}^2$ are about 0.22.

Number of observations	1881
Standard error	6.408
R^2	0.222
$\overline{\mathrm{R}}^2$	0.220
F	133.948
F level of significance	0.000

Table 5.1.2 – Bachelor's degree graduates regression statistics

5.2 MR II – bachelor's and master's degree graduates

This multivariate regression model covers both bachelor's and master's degree graduates. For this regression, the variables considered are as follows:

- Graduation grade as dependent variable Y
- Four independent variables X: gender, graduation age, if he/she is a trainee or not, if he/she is Italian or not and if he/she a bachelor's or master's degree graduate. Graduation age a part, the others are treated as binary variables.

	Coefficients	*Standard error*	*Stat t*	*Level of significance*
Intercept	136.554	1.537	88.829	0.000
Gender (1=M, 0 = F)	-0.135	0.217	-0.620	0.535
Graduation age	-1.642	0.056	-29.453	0.000
Trainee (1 = yes, 0 = no)	-0.991	0.241	-4.109	0.000
Italian (1 = yes, 0 = no)	6.329	0.363	17.454	0.000
Bachelor's degree (1 = yes, 0 = no)	-13.180	0.270	-48.797	0.000

Table 5.2.1 – Multivariate regression model for bachelor's and master's degree graduates

From table 5.2.1 it is possible to observe and compare the results obtained with those of table 5.1.1 of the previous model. While it seems to be confirmed that gender is not significant in terms of contribution, the nationality in this model gained value by contributing to the degree grade. The latter is probably due to master's degree graduates, in whom a greater foreign component was observed in the descriptive analysis than in the bachelor's graduates.

It can also be seen that the binary value regarding the type of degree (bachelor or master) is significant, decreasing by 13 the graduation grade for bachelor's degree students. This coefficient confirms what can be observed in tables 4.2.1 and 4.2.2, where this difference between the two courses was evident.

The results in terms of goodness-of-fit (table 5.2.2) compared to the model MRM I of the previous subchapter are better: the indices R^2 and $\overline{R}^2$ are almost doubled and the significance level F is lower than limiting rounding precision of Microsoft Excel spreadsheet (reported in the table 5.2.2 as 0).

Number of observations	4050
Standard error	6.653
R^2	0.418
$\overline{R}^2$	0.417
F	580.021
F level of significance	0

Table 5.2.2 – Bachelor's and master's degree graduates regression statistics

5.3 MR III – master's degree graduates

The last multivariate regression model concerns the master's degree graduates. For this regression, the variables considered are as follows:

- Graduation grade as dependent variable Y
- Four independent variables X: gender, graduation age, if he/she is a trainee or not, if he/she is Italian or not and bachelor's degree graduation vote. Graduation age and bachelor's grade a part, the others are treated as binary variables.

The results obtained are reported in table 5.3.1. Again, the nationality and gender of the students have a lower level of significance than the other variables. Graduation age and the bachelor's grade contribute in major part, followed by the binary variable linked to the internship. In contrast to the bachelor's degree, if the student has done an internship generally, he or she is almost five points higher than students who have not done an internship.

	Coefficients	*Standard error*	*Stat t*	*Level of significance*
Intercept	99.819	3.004	33.228	0.000
Gender (1=M, 0 = F)	-0.740	0.277	-2.670	0.008
Graduation age	-1.574	0.082	-19.141	0.000
Trainee (1 = yes, 0 = no)	4.692	0.642	7.307	0.000
Italian (1 = yes, 0 = no)	0.409	0.282	1.453	0.146
Bachelor's degree graduation grade	0.382	0.018	21.700	0.000

Table 5.3.1 – Multivariate regression model for master's degree graduates

As can be observed in table 5.3.2, the goodness of fit of the model in terms of linear determination indices R is comparable to that obtained for both bachelor's and master's degree graduates in subchapter 5.2, and the relationship between regressors and dependent variable is confirmed by the value of Fisher's F-test.

Number of observations	1921
Standard error	5.921
R^2	0.391
$\overline{R}^2$	0.389
F	245.482
F level of significance	0.000

Table 5.3.2 – Master's degree graduates regression statistics

The results obtained evidence that bachelor's and master's degree graduates may have different relation with the independent variable considered, so it may be reasonable to distinguish two different model for these two types of students.

6 Conclusions

The current crisis context is exacerbating the youth crisis, with an estimated youth unemployment rate of 33.8% in 2021. The number of hours worked by young people has fallen by more than twice as much as that of older people, many have lost their already precarious jobs and many others have struggled to find one as recent graduate given the limited vacancies. The rate of newly employed graduates one year after graduation is, as already mentioned in the introduction, 69.2% and 68.1% for first and second level graduates respectively. Having done an internship, as shown in the AlmaLaurea report, increases the possibility of being employed one year after graduation by 12.2%.

The proportion of student traineeships increases every year, but even this due to the pandemic has decreased from 59.9% in 2019 to 57.6% in 2021. The internship represents a special industry-university relationship, which is increasingly sought after by both candidates and universities themselves as this leads to a greater integration of students into the world of work and therefore greater prestige for the universities themselves.

Through this tool, trainees develop transversal competences and realistic expectations for when they will undertake their first job. Moreover, it is a favorable point for recruiters who consider having done or not done a traineeship to be one of the measures they consider most suitable in assessing a candidate.

For the thesis work, data of 4050 students who graduated in the last six years at the Politecnico di Torino in Bachelor and Master Engineering were analyzed, carrying out several descriptive statistical analyses, showing the results in tables and graphs. In order to investigate the most particular aspects, targeted tests were then carried out to better describe the data and look for relationships between the students' characteristics.

From the data compared in the chapter on data analysis, statistics and graphs, some peculiarities were found: the proportion of trainees was increasing, in line with national data, until 2019 (reaching a maximum of 72% for master's students) and then decreased due to the pandemic crisis. Additionally, despite the lower number of female students compared to the number of male students, there is no gender disparity in terms of participation in the work placement program. Further assessment was carried out in terms of geography and origin of students: the Politecnico di Torino and Piedmont and its companies welcome many regional, interregional and international student trainees. Although the majority of students in the Bachelor's degree are Piedmontese who do an internship in Piedmont, the trend is reversed for the Master's degree, as the majority of students this time are not Piedmontese but do an internship in Piedmont.

T-test were used to compare the graduation grades of trainees and non-trainees, and two different results were derived from these, depending on whether they were bachelor or master students. In fact, if for the Master's degree students, as can be seen from Tables 4.1.2 and 4.2.2, having done an internship or not does not lead to a difference in the grade at graduation or in the grade point average, for the bachelor students this is the case. From tables 4.1.1 and 4.2.1, the marks for trainees are lower than those of non-trainees; this, as already explained in chapter 4, may be due to the fact that the practical traineeship does not count on the overall grade average, but the two subjects chosen by non-trainees do, so it could lead to an increase in the grade average, even if, given the many subjects of the bachelor degree, it should not count too much.

What is also noteworthy is the difference in age at graduation between those who do internships and those who do not, for bachelor's graduates. Those who do traineeships are on average older than those who do not. This peculiarity could be explained by the fact that the practical traineeship, although in terms of CFU and therefore of hours it should take the same effort as the chosen subjects, this is not the case, the practical traineeship probably needs more effort from the students to complete it, possibly due to the fact that it is something new far removed from the methodology used in academic studies to date, so they need more time to adapt and calibrate themselves to this new situation. In the case of the Master's degree, this difference in age at graduation does not exist; it is likely that students, who are also older and have more experience, are able to better manage the time to devote to their subjects and to their internship. In addition, the internship is often associated with the thesis, so it does not require more time, but rather provides an opportunity to supplement the thesis with experience in the company or organization with which they are working during the thesis.

Once the t-tests had been analyzed, the question of graduation grade and whether or not to do an internship was investigated for bachelor's graduates with a multivariate regression. The aim was to explain the graduation grade through several factors characterizing the students. Confirming the t-tests, the variable graduation grade is significantly explained by the internship and a negative correlation was found between grade and having participated in the internship program. A significant negative correlation was also found with age, i.e., the older the student, the lower the grade. Gender and the student's country of origin were not significant.

In order to support the positive contribution of an internship to a master's student, a further multivariate analysis was developed considering various factors. The internship with some significance in this case positively relates to the degree grade. Similarly, the grade obtained in the bachelor's degree course also significantly explains the grade obtained in the master's degree course, and again age is negatively correlated with the grade, while the student's origin and gender are not significant.

In general, studies show that internships have a certain influence on the academic career. More and more students are choosing this option during their studies, knowing that it will require a considerable effort, but that in the long run it can lead to optimal results in view of entering the working world.

As future work, the thesis can be further developed by taking into consideration a larger proportion of students at the Politecnico di Torino, as well as all other engineering addresses, and see if the data trends remain consistent or if there are any discrepancies.

7 References

Becker, G. S. *"Human capital: A theoretical and empirical analysis, with special reference to education".* New York: National Bureau of Economic Research, 1964.

Bologna Declaration *"The Bologna Declaration of 19 June 1999: Joint declaration of the European Ministers of Education."* Bologna, Italy, 1999.

Consorzio Interuniversitario AlmaLaurea *"Rapporto 2021 sul profilo e sulla condizione occupazione dei laureati."* Italy, 2021

Di Meglio Gisela, Barge-Gil Andrés, Camiña Ester, Moreno Lourdes. "*Knocking on employment's door: internships and job attainment"*. 2020

Fachelli S., Toboso E.F. *"The value of university internships"*. Universidad de Navarra,2021

García Delgado J. *"Bolonia y la buena práctica de las prácticas"* - La CuestiónUniversitaria. Cátedra UNESCO de Gestión y Política Universitaria, 2009

Gault, J., E. Leach and M. Duey. *"Effects of business internships on job marketability: The employers' perspective"*. West Chester University, 2010

Istat, Ministero del Lavoro e delle Politiche Sociali, Inps, Inail, Anpal *"Il mercato del lavoro 2020"*. Italy, 2021

Kinash S., Crane L., Judd M.-M., & Knight C. *"Discrepant stakeholder perspectives on graduate employability strategies"*. 2016

Mincer, J. *"Schooling, experience and earnings"*. New York, NY: Columbia University,1974

Pereira Elisabeth T. and Vilas-Boas Madalena, University of Aveiro, Portugal and Rebelo Càtia F.C., University of Aveiro, Portugal; *"University curricula and employability: the stakeholders' views for a future agenda"*. Cardiff University, UK, 2020

Roddis E. and Morgan L. *"Education and Skills Survey"*. London: Confederation of British Industry, 2008.

Vicario G, Levi R. *"Metodi statistici per la sperimentazione"*. 2008