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**Three essays on institutional framework's effects on the human capital development and  
occupational outcomes**

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## **Abstract**

This thesis has the goal to investigate how the human capital, take into account in different age period, can be influenced by reform in the institutional assets.

In the first chapter universities' students are take into account, analysing whether a change in the labour market can affect the time needed from the students to obtain their degree. It is founded that a deregulation, that lead to an increase of the number of pharmacies, had a positive effect on the speed with which students reach the degree.

In the second chapter using the same deregulation of the first one, the focus point is moved on the job satisfaction of the worker in the pharmacist sector. The results show that, not only the deregulation lead to an increase of speed for the students, but after they become workers in the abovementioned sector, they are also more likely to be satisfied with their job.

Finally, in the third chapter, is analysed the effects of a reform involving a change in the asset of the city council on the level of primary school students. This first chapter seems to demonstrate that there is no effect on the younger students.

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## **Introduction**

The idea behind this project is to study the effects of a change in the institutional asset in the level of human capital. Since the concept of human capital can take into account different aspect, during this work, three different moment, involving the development of skill level, are investigated.

The first chapter, labelled “Give me a reason to run: The effect of the liberalization of professional orders on students’ time to degree” aim to assess whether a change in the labour market, through a deregulation of a professional order, led to a reduction in the time spent by the university’s students to reach the degree. The results highlight that students enrolled in the faculty interested by the deregulation reached their degree faster. The art.11 of the law enacted on 24th January 2012 bring the number of pharmacies from one for every 5000 inhabitants to one for every 3300 inhabitants, increasing their total number. This change means easier access to the labour market for the students. Using different estimation methods and a dataset from the University of Calabria, containing information on students enrolled in the pharmacy faculty, and others five-years degree, we analysed this topic. As mentioned before, the results show that, meanwhile other students did not change their speed, those enrolled in the pharmacy course become faster in the period just after the reform.

The second chapter, labelled “The Impact of Reducing barriers to Entry into Professions on job satisfaction: The Case of Pharmacists”, represent the following step of the first section. In fact, in this chapter, we analyse the job satisfaction of the pharmacists, after the reform. Using an ISTAT database, containing information on Italian workers, we find that the level of job satisfaction of the workers in the pharmacy sector is increased in the considered period. To measure the variable of interest, we used the “ordered probit” model, generating five levels of satisfaction, from 0, which means “not satisfied”, to 5, which means “very satisfied”. The results show that, after the reform, the pharmacists are more likely to set their satisfaction in the higher levels, 4 and 5. Finally, for a deeper analysis, we evaluated some of the variables which can explain the level of job satisfaction, such as the income and the overtime hours.

Finally, the third chapter labelled “Gender quotas and public expenditure: the effect on primary school students” aims to evaluate whether an increase in public investment in the primary school can affect, in a positive way, the level reached by students. Using a quasi-

experimental model, the Regression Discontinuity Design, we try to understand if after a reform which involves the percentage of women in the town council, which in turn rise the public expenditure in education, the students reach a better performance during the “invalsi” test. The work is splitted in three parts. In the first one the police evaluation is conducted to see if the new law about the percentage of women in the city council is effectively increased. This first part gave a positive result. In the second one we try to point out whether more women in the council means more investment in the educational sector, which seems to be confirmed by the results. In the last part the mark of the “invalsi” test is analysed, but unfortunately, the results does not coincide with the expectative.

The common topic among these three chapter is the human capital. In fact, even if we take in account different person, depending on their age, all of them represent either the future or the current human capital. The first chapter is the most difficult, because since the focused is on primary school students, it is hard to expect to see a real change in their skill levels, since they are at the first stage of their growing path. On the contrary in the others chapters, the person take into account are in an advanced stage of their training, and for this reason is more likely to find a change in their skill level.

The thesis is organized as follows. In the first chapter we present the analysis on universities’ students and their link to the labour market. In the second chapter, the focus is moved on the job satisfaction of the workers. In the third chapter, the effect of public expenditure on primary school students is analysed. Finally, we expose the concluding remarks.

## **CHAPTER 1**

# **Give me a reason to run: The effect of the liberalization of professional orders on students' time to degree**

### **Abstract**

This work evaluates whether it is possible to link the time required by students to graduate with labour market opportunities. The idea is grounded on a policy reform that in Italy almost doubled the number of pharmacies, thereby easing labour market access for students graduated in pharmacy courses. The impact of the reform on the speed to graduation is set out by using a Regression Discontinuity Design model on data about students enrolled in a five-year faculty of the University of Calabria. Results show that the deregulation reduced graduation time without affecting the degree mark.

## **1.1 Introduction**

The objective of this project is to demonstrate how a shift in the demand curve in the labor market can have a positive effect on the course of study undertaken by students, who are destined to enter the aforementioned market under analysis. The study concerns specifically the shift of the demand curve, as over time most of the studies and empirical evidence have been directed on the possible ways of modifying the supply curve, improving the quality of human capital to strengthen the market accordingly.

The analysis performed through this thesis work aims to demonstrate that it is possible to obtain the same result but with a reverse procedure: to be able to improve the quality of human capital by making the labor market more accessible and more competitive.

In this case, the basic idea is to verify whether a deregulation of the professional order of pharmacists, which represents a change in the labor market, can bring a tangible evolution in the quality of human capital through an improvement in the path of students enrolled in university courses that provide a possible job outlet such as that of pharmacists. We will therefore examine the Decree-Law of 24 January 2012 which modify, among other things, the pre-existing Article 1 of Law 8 November 1991 n.362 (which in turn had modified the previous article 1 of the Law of 2 April 1968 n. 475). Art. Article 11 of the aforementioned Decree-Law, in fact, establishes that the number of pharmacies goes from one per 5000 inhabitants to one every 3000 inhabitants, effectively increasing the number of pharmacies in the area.

Although the Decree Law in question was issued in 2012 it is easy to assume that the students did not immediately become aware of it, and moreover the implementation of the decree itself could hardly be carried out quickly for obvious reasons. For this reason, 2013 will be used as a reference year to analyze the effect of the Decree Law on the labor market: it is assumed, therefore, that it took a year for this deregulation to have been understood by the students themselves, and consequently pushed them to speed up to finish as quickly as possible the duration of their studies, thus reducing the time to degree.

In the second paragraph we will analyze the pre-existing literature concerning "time to degree" and "deregulation". Below, in the third chapter we will show a descriptive statistic of the dataset, used to analyze the case. Finally, in the fourth chapter, the empirical evidence will

be presented, describing the procedures carried out with the different software used for the analysis, and showing through some images the results obtained.

## **1.2 Literature review**

### **1.2.1 Time to Degree**

The "out-of-course" is a phenomenon with a persistent character in Italy and beyond, given that the same is easily found even outside the Italian borders. This phenomenon has been analyzed in several studies, and it was possible to see a decrease in students out of course only in 2001, thanks to the reform that led to a modification of the courses of study, introducing the so-called "3 plus 2" system, which provides for a first three-year course of study, which is then followed by a second path lasting two years. In the two years following the reform, the number of out-of-course students continued to decrease, although it subsequently returned to growth to around 35% in 2011.

Initially, the studies carried out focused on the consequences of exceeding the minimum years necessary to achieve the degree, and on how this phenomenon affects the working life of the subject. These studies showed that students who do not graduate on time experience negative effects in the workplace. For example, Brodaty, Gary Bobo and Prieto in 2008 showed that during the first phase of working life, each additional academic year spent on graduation, results in a reduction in earnings of about 9%. From the work of Aina and Pastore in 2012 it emerges how graduating "out of course", not only leads to a lower salary, but also involves an increase in the chances of carrying out jobs that are not actually in line with the qualification obtained. Therefore, not only is the remuneration conditioned, but even the possibility of carrying out the work that the student had chosen to achieve at the time of selecting the faculty to which to enroll.

Only after several years the studies started to focus on the causes of the "out-of-course". This is due to the fact that, at the beginning, all the fault of this phenomenon was attributed to students and their behavior. Nowadays, different studies highlighted that, even if it is important to consider students into the research, is important to analyze other factors as well. For what concern students, the AlmaLaurea data showed how people who followed more than 75% of the lessons have more possibilities to reach the degree faster than others. As pointed

out before, there are other fact to take in account: Bound et al. (2010) highlighted that a student who is sustained by his family during the studies, is more incline to reduce his efforts and this means being slower in reaching his degree.

As mentioned before, there are different facts that can bring to this conclusion. For example, the university system and how it is organized can easily influence how long it takes to reach the degree. In fact, a very well organized university can help the students to reach their goal easily. Bound and Turner (2007) analyze how an increase in the number of students enrolled in a university, not being followed from an increase of resources from the same institution results in a decrease of the performance from the students, either in terms of mark or in time to degree.

In relation with the research that this work wants to highlights, is important to recall that the labor market is the natural outlet of someone who took a degree and so, it is important to analyze this market to understand if there is the possibility that what happen in the labor market can affects the students' performance. Some studies confirmed the theory called "parking lot hypothesis", namely a higher unemployment level reduce the opportunity cost of studying and increase the tendency of students to prefer the enrollment in the university instead of the direct entry in the labor market. Analyzing this theory in different regions, is pointed out how the number of students "out-of-time" is higher where the unemployment rate is higher as well.

The attention attracted by this phenomenon, leads the economist to develop different theories. Among these models, the most important, in relation to this work, is the "Job Search" model, from Sascha Becker (2006), that is the one closer to the analysis conducted in this project. In his work, the economist did not ended the analysis on the monetary investment in instruction, but he focused on the time investment as well. In the study are examined two kind of person: people with an university degree and people with a high school diploma. For the latter there is a choice to do: take an university degree or not. According to Becker, the choice will be influenced from different variables and the two most important are: job opportunity, measured by the "job arrival hazard rate" and the difficulty in reaching the degree. The unskilled workers will decide which of the two possibilities is the most convenient.

Analyzing these two variables, unskilled workers will decide which of the two possibilities is better. In the event that the choice falls on the search for a job this would result in an increase in unskilled workers. On the other hand, another consequence would be a decrease in the average number of years taken to obtain a degree. As mentioned before, this model comes closer to what this work is intended to demonstrate., given that it is the first model to put the university world in closer relationship with the labor market, going to highlight how the possibility of finding or not a job, influences the choice of young people to enroll in university or even to undertake a certain course of study rather than another.

Starting from the identification of the causes of the phenomenon of “out-of-course” it is possible to indicate any steps to take to resolve this issue. Possible remedies have already been presented, which, however, are of complex implementation as it would be necessary for them to act simultaneously on different aspects. These aspects concern: the way of access to the university, the didactic organization, the financing of the university system, and last but not least, links with the labour market. In addition, it can be useful to start dealing with the problem already from the stages before enrolling in the university, thus resorting to the strengthening of guidance activities, so as to make it easier to choose the faculty. Of course, all the remedies described so far require a better allocation of the physical and human capital endowments available to each university. To avoid the increase in dropouts and the prolongation of studies, action can be taken on strengthening the right to study and introducing greater incentives for deserving students, as indicated in the OCSE report of 2013. Moreover, it is useful to remember that several studies have shown that an increase in tuition fees would have the effect of driving young people from the lower social classes away from university, thus decreasing the investment in human capital. Finally, the last front on which it is possible to try to heal the problem of the out-of-course is that of the transition phase from university to the world of work. Regarding this phase, the use of internships during the university course is progressively spreading, but this diffusion proceeds slowly.

On the practical front some universities have started some experiments aimed at reducing both the time needed to reach the degree, and the number of dropouts. Among these various ideas, a very interesting one to analyze in this work is the one proposed by the Georgia State University. In fact, in 2011, the office of strategic plans of the aforementioned university launched an initiative with which it increased by 42 units the number of student advisors. Two

years later, the consulting office had 70 consultants. The project continued with the help of the Education Advisory Board, who created a web platform as an extension of the consulting office. In addition, through the system, based on student data, collected over the past seven years, the university has created a database of variables that can affect the likelihood of a student going out of course. This system consists of more than 700 "alarms", which indicate that the student has performed an action that makes him fall into the risk group. Ever since this system, called Graduation Progress Success, came into operation in August 2012, more than 13,000 students have been "notified". Positive results are not long in coming. In fact, during the spring of 2013, the number of graduate students was the highest ever in the history of the Georgia State University.

Among the various literatures of reference, the one that comes closest to the work of this thesis is the *working paper* elaborated by Pietro Garibaldi, Francesco Giavazzi, Andrea Ichino and Enrico Rettore who studied a time to degree case related to Bocconi University in Milan. The reason why it is believed that the *working paper* of these researchers approach this thesis work is due not only to the topic studied, but also because of the method used for empirical evidence: the Regression Discontinuity Design. In fact, in their work, the researchers built an RDD, based on the family incomes of the students, to compare two different groups of students, who in terms of income were immediately before and after the level chosen for the *cutoff*. These two groups of students, while paying a different level of tuition fees, are identical in terms of observable variables. Of course, the two different groups of students chosen in the analysis expect to pay a different level of tuition fee in case they fail to graduate by the end of the last year. Using precisely this expectation, the researchers were able to demonstrate how an increase of 1,000.00€ on the fees paid in the last year of the regular course, have a negative effect on the probability of graduating late; more precisely, a 6.1% reduction in this probability has been estimated. Finally, it should be noted that the increase in fees envisaged so far alone leads to a reduction in the delay in graduation, which is not in turn affected, in this case, by an increase in the quality of education offered to students.

### **1.2.2 Liberalization**

In spite of the expectations generated by the process of monetary unification, the growth of the European economy is highly unbalanced, showing growth for some countries and

degrowth for others. Among the countries that are part of the latter group there is Italy. In fact, the Italian economy is growing less than the European average, and also going to compare the level of Italian exports with that of other European nations, it is clear that Italy is also poorly competitive. It is precisely from the idea of low competitiveness that the need to debate about deregulation starts. Italy's competitiveness problems, in fact, are certainly not new. Already in past years, the issue had been remedied by periodically resorting to currency devaluations. Following the signing of the Maastricht Treaty and with the accession to the single currency, having lost the possibility of devaluing their currency, those responsible for economic policy have sought a new way to solve competitiveness problems.

Among the various economists who have been involved in finding an alternative method to cope with Italy's lack of competitiveness, there is a neoclassical-liberal group, who have developed a theory that greater flexibility, achieved through deregulation, can lead to growth. To explain the low Italian growth, these researchers highlight some factors, including the high contribution rates and the presence of protected markets. These two aspects would affect raising the price level of Italian products, although the main reasons are attributed to the malfunctioning of the labor market which consequently leads to low labor productivity. This low labour productivity is also attributable to the inefficiencies of Italian institutions. They refer, precisely, to the contractual model and to the regulations considered poorly inclined to meet the needs of flexibility. In fact, Boeri and Garibaldi (2007) have argued that increasing injections of flexibility into the Italian labor market would rise labor productivity for a variety of reasons, such as:

- a) companies would be able to efficiently allocate the workforce within their organization in time and space;
- b) the increased risk of job loss would push individual workers to increase productivity, given the high opportunity cost associated with job loss;
- c) the positive expectation on the effects of companies' reaction times to market needs in the presence of flexibility would incentivise innovative investment and capital allocation in the most competitive sectors.

The idea on which these scholars base their thesis is that the obstacles to the dismissal of workers who are "overguaranteed" make a turnover impossible. From what has been

highlighted, therefore, it emerges that the reduction of turnover prevents the escape of inefficient workers and the entry of individuals who could be more efficient. In addition, these economists tend to point out that a more flexible labor market would be more likely to react positively to exogenous shocks, preventing the presence of excessive internal friction from making the economy suffer from long and painful depressive phases, before it can find a new equilibrium position.

Therefore, for this group of economists, the solution to the problems described so far lies in greater flexibility, achievable through deregulation. But what is the deregulation? Deregulation is the process by which governments and states cease most of the controls on the market and eliminate restrictions in the economy, in order to encourage the operations of the market itself, which to this extent would be considered as a self-regulating body. Naturally, the quality of the regulation is important, not the quantity, which means regulating business intelligently, rather than simply removing or adding regulations in large numbers. In fact, many processes labeled as deregulation have actually been nothing more than examples of re-regulation alongside a process of market liberalization, which have had as protagonists public companies that have been included in the private sector. Instead, the basis on which deregulation is based, in fact, is that fewer rules lead to a greater level of competition, to remove bureaucratic constraints and consequently to greater productivity and efficiency, as well as to lower costs for companies which then lead to lower prices for final consumers.

In conclusion, what has been written so far highlights how according to these economists greater flexibility of the labor market would significantly affect both wage dynamics and productivity, leading to a decrease in unit labor costs. As a result, there would be an increase in competitiveness. The problem with all this lies in the fact that there is a lack of empirical evidence to support these conclusions outlined by the group of economists cited above.

To address this lack of empirical evidence on the effect of deregulation, scholars refer to the Employment Protection Legislation Index, able to measure the level of employment protection provided by the legislation of a country. This index, which over the years has been modified and updated, is elaborated by the OECD starting from 21 "micro-indicators" of rigidity, selected on the basis of three macro categories, which are: the protection of workers against individual dismissals, the specific requirements for collective redundancies and the

regulation of forms of temporary work. The level of this indicator is inversely proportional to the level of labour market flexibility established by the legislation of a given country.

Using the above index the scholar Riccardo Realfonzo (2013), it has shown that deregulation not only does not produce the effects that the abovementioned researchers had foreshadowed, but that the effect is quite the opposite. In fact, by relating the absolute change in the EPL index (recorded in 1993 and 2012) with the arithmetic average of the annual deviations in the unemployment rate for the same period, he has shown that as the EPL decreases, the unemployment rate tends to increase.

With regard to the aforementioned limit, on the lack of empirical evidence to support the theory indicated by the researchers, this thesis work aims to provide a first empirical evidence, which although not entirely focused on the same aspects, is still based on the idea of a correlation between the improvement of working conditions in a country and the legislative deregulation of the same.

Although it is not possible to cite works that deal with the empirical evidence of deregulation, is still possible to cite some works that have shown how stringent regulation has led to a decrease in market competitiveness.

The work that is going to be exhibited here is the one of Fabiano Schivardi and Eliana Viviano, "Entry barriers in Italian retail trade". The two scholars taking inspiration from previous works, want to show how stringent anti-competitive regulations are the main cause of the difference in productivity growth between Europe and the US, in the service sector. Numerous other studies have shown a positive effect of liberalisation on competitive performance. However, these works base their empirical evidence on *cross-country* data, with qualitative indicators of regulation, which makes it difficult, if not entirely impossible, to quantify the cost of barriers to market entry in terms of competitiveness. For this reason, in their work, Schivardi and Viviano preferred to consider a single sector in a single country: the service sector in Italy. Their analysis started in 1998, when an attempt was made to modernize this sector by applying more regulation. The main part of the new law, born in the aforementioned year, concerns the possibility for local authorities to regulate the entry into the market of medium and large shops. As it was plausible to think, the vast majority of local authorities (17 out of 20 regions) have basically used the new law to create real barriers to

entry. The purpose of the work was to analyze the effect of the aforementioned barriers on productivity and profits. This project also has a similarity with this thesis work: to study the effect of barriers to entry, Schivardi and Viviano (2011) used the Difference in Difference model. In their model it was chosen to analyze the effect before and after the year 2000, which is the year in which the effects of the new legislation enacted in 1998 began to be deduced. What has been demonstrated with this empirical evidence is that indeed barriers to entry have a significant effect on local competitive performance. In fact, considering an increase in the number of service activities, although the marginal profit goes down by 21%, on the other hand, it is possible to see that the productivity will increase of 7.5%.. In addition, not only does the increase in competitiveness in turn increase the propensity to spend on Research and Development, but what's more, no significant effect on salaries was found in this *paper*.

What has been described so far leads to a logical conclusion, according to which a stringent regulation, represented in this case by the barriers to the entry of a market, leads to having few winners and many losers. In fact, higher profits make "winning" activities already within the market, but the high selling costs and low competitiveness make "losers" both the activities that would like to enter the market as well as the final consumers and the economic system itself.

## **1.3 Methodology**

### **1.3.1 Data**

What described until now, is based on a few empirical evidences due to the lack of research on the “out-of-time” phenomenon. Moreover, since the idea behind this project is to analyse the relationship between two topic (out-of-time and liberalization) it is easy to understand the difficulty in finding other works about it. So, the goal of this chapter is to find a new empirical evidence more specific than those described in the literature review.

It was possible to realize this empirical evidence thanks to the help of data concerning graduate students from the University of Calabria, provided by Consorzio Interuniversitario “AlmaLaurea”. From a first view of the data it is possible to see how these trace graduate students from the year 2009 to the year 2015. It was chosen to work using this period of time, because the phenomenon that is analyzed in this work arises from a law enacted on 24<sup>th</sup>

January 2012 that goes to modify the pre-existing Art.1 of the law issued on 8th november 1991 no. 362 (which in turn had modified the previous Art.1 of the law issued on 2nd april 1968 no. 475). Art. 11 of the aforementioned decree-law establishes that the number of pharmacies goes from one for every 5000 inhabitants to one for every 3300 inhabitants, increasing the number of pharmacies. Well the decree-law of interest for this work was issued in 2012, it was easy to predict that the students had not become aware of this decree immediately, and moreover the implementation of the decree could not be instantaneous. For this reason, it was thought to use as a year of “*cutpoint*” the year 2013, providing that it was necessary a year of time so that the effect of this deregulation could be tangible and therefore analyzable.

Given that premise, the objective of this thesis is to demonstrate that this liberalization of the professional order of pharmacists has had a consequence on the duration of the course of study of students enrolled in pharmacies degree. Once it is established whether or not this causal link is present, the sign of the effect will be analyzed. It is expected to find a sign that will then be negative, if the duration of studies will tend to decrease.

The Dataset used for empirical analysis involves 26,682 students, all part of University of Calabria, divided according to the faculty of enrollment. The data also took into account the type of degree: Bachelor's degree, Master's degree and 5-years Master's Degree.

Given that the faculty of interest for this analysis was that of pharmacy, a resizing of the dataset was adopted. Providing for the aforementioned degree a duration of 5 years, it has been decided to keep only the 5-years Master's Degrees. This has unfortunately led to a drastic decrease in the dataset, bringing the observations from the initial 26,682, to only 2,207 observations. These observations concern only the faculties of: pharmacy, jurisprudence ed engineering, which are the only three 5-years degree faculties in the University of Calabria. Despite the small number of observations, this cleaning was necessary because could not have been used as a control group a faculty that provided a three-year degree.

Going therefore to analyze the data present in the "clean" dataset, can be deduced from the observation of Table 1.1 that out of a total of 2,207 observations, 1,070 concern the Faculty of Pharmacy, representing the 48.49% of the total. Meanwhile Law and Engineering, have 917 and 220 observations respectively (which represent 41.55% and 9.96% of the total).

Table 1.1 - Number of observations of the dataset

<b>TOTAL</b>	<b>2207</b>	<b>100%</b>
Pharmacy	1070	48,49%
Jurisprudence	917	41,55%
Engineering	220	9,96%

It is good to highlight how of these students, most are out of course. In fact, going to numerically analyze the situation that concerns students in course and out of course, we can see that as many as 82.15% of students fail to finish their studies within the term of five years, while only 17.85% succeed, as can be seen from the following estimates (listed in Table 1.2):

Table 1.2 - Percentage of students out-of-course

`. tab fuoricorso`

fuoricorso	Freq.	Percent	Cum.
0	394	17.85	17.85
1	1,813	82.15	100.00
Total	2,207	100.00	

Instead, dividing the dataset according to the year of graduation, it is possible to see, observing Table 1.3, how over the years the number of graduate students presents a growing trend, which may be due to the higher number of enrollment that are registered from year to year, given that over time the facilities for enrolling in university have always been increasing.

Table 1.3 - Number of graduate students divided by year of graduation

```
tab anno_lau
```

anno_lau	Freq.	Percent	Cum.
2009	262	11.87	11.87
2010	272	12.32	24.20
2011	307	13.91	38.11
2012	334	15.13	53.24
2013	324	14.68	67.92
2014	341	15.45	83.37
2015	367	16.63	100.00
Total	2,207	100.00	

Although the previous table almost always shows a growing trend, it is easy to see how between the year 2012 and 2013 there is a slight decrease in graduates; given that 2013 is precisely the year chosen for the “*cutoff*”, this could suggest that a decrease in the time taken to graduate may be due to the lower number of students who have graduated. To avoid this possibility right away it was decided to create a second table that always shows the number of graduate students according to their graduation year, but taking into account only the faculty of pharmacy. As can be seen, from the Table 1.4, the growing trend of graduates in the pharmacy course does not show any decrease between 2012 and 2013, but continues normally in its trend.

Table 1.4 - Number of graduate students in pharmacy divided by year of graduation

```
tab anno_lau if (farmacia==1)
```

anno_lau	Freq.	Percent	Cum.
2009	147	13.74	13.74
2010	140	13.08	26.82
2011	129	12.06	38.88
2012	146	13.64	52.52
2013	153	14.30	66.82
2014	183	17.10	83.93
2015	172	16.07	100.00
Total	1,070	100.00	

### 1.3.2 Models

As specified above, this thesis work is based on the need to provide new empirical evidence in the field of the labor market, focusing on university students, who represent the new-entries in the sector. This study was possible thanks to the dataset concerning graduates students, obtained with the collaboration of the office of "AlmaLaurea".

Going a little more into the specifics of the analysis, the goal is to attest that a shift in the demand curve in the labor market, can have a positive effect on the course of study undertaken by the students. Especially, in this work we want to demonstrate how the increase in the number of pharmacies in Italy, which represents an important deregulation, may decrease the time to degree of pharmacy students, which would lead to a decrease in students out of course.

To do so, two distinct methods will be applied, starting from the analysis with the Difference-in-Difference estimator, and then continue using a method not only more effective, but also easier to read: the Regression Discontinuity Design (RDD). The latter methodology is in turn divided into two parts: first the analysis of the RDD chart will be carried out, that provides a graphical view of the work; afterwards the regression itself will be developed and illustrated. The softwares used for this empirical evidence are "STATA" and the "R" program. the latter allows to use RDD regression even in the presence of non-continuous variables, as in the case of the variable about the year of degree, used in this work.

### ***1.3.2.1 Difference-in-Differences***

A linear regression model is used for this analysis, in which the estimator “*difference in difference*” is inserted. This type of estimator is used to estimate the differences between two groups, that are considered before and after a certain event. More precisely, this model requires the presence of a treatment group, which was involved in the treatment under analysis, and a control group, which, on the other hand, has not undergone any modification due to the treatment. These two groups must be analyzed in two different periods, that are one prior to the treatment and one subsequent. After which a check is carried out to verify that the treatment has had a concrete effect, going to calculate the difference between: the difference between the treatment group before and after the treatment itself, and the difference between the control group before and after the same treatment. Hence the name of the model “Difference in Difference”. As can be easily guessed, if the above difference is significant will mean that the treatment has had an effect; On the contrary, if the difference is not significant, would mean that the treatment had no effect.

In this case of study, the treatment group will be represented by the students belonging to the pharmacy course, while law and engineering students will be part of the control group. Regarding the treatment, as already mentioned, while referring to the art. 11 of the decree-law issued on 24<sup>th</sup> January 2012, will be used as an earlier period the years from 2009 to 2012, and as a period after treatment the years from 2013 to 2015. So, the model will be the following:

$$Duration = \beta x + \gamma [pharmacy * time]$$

In this model the dependent variable is represented by the time to degree, the “x” represents a series of variables, necessary for the refinement of the model, which will be illustrated later and finally, the variable of interest is represented by “ $\gamma [pharmacy * time]$ ”, in which the parameter  $\gamma$  represents the estimator “difference in difference” as previously described.

Regarding the variables represented in the previous model by “x”, are illustrated in Table 1.5, reported below. For convenience it was preferred not to report all the variables present in the dataset, but only those that have been used within the regression.

Table 1.5 - Description of the variables in the model

Variable name	Variable description	Value assumed by the variable
durata	Time needed from the student to reach the degree	From a minimum of 4,51 to a maximum of 23,44
fuoricorso	dummy variable: 1 if student is out-of-time, 0 if not	either 0 or 1
votolau	Degree mark	From a minimum of 82 to a maximum of 113
giur	dummy variable: 1 if student is enrolled in law degree, 0 if not	either 0 or 1
ing_arc	dummy variable: 1 if student is enrolled in engineering degree, 0 if not	either 0 or 1
etam	Student age at degree time	From a minimum of 22,79 to a maximum of 55,72
anno_lau	Year of degree	From year 2009 to 2015
tempo	dummy variable: 1 if after the treatment, 0 if before	either 0 or 1
farmacia	dummy variable: 1 if student is enrolled in pharmacy degree, 0 if not	either 0 or 1
tempo*farmacia	diff-in-diff variable, interaction of variables "farmacia" and "tempo"	either 0 or 1

Once the variables that will be included in the linear regression have been analyzed we can proceed to the implementation of the regression through the software "STATA". But first it is good to specify that within the model the variable "ing\_arc" is not reported, despite this is present in Table 1.5; this is in order to avoid the "dummy trap". Moreover, to show a regression that was more precise it was decided to use the cluster function, through the year of graduation, using the variable "anno\_lau".

Before reaching the final result, several regressions were elaborated. The final result of the regression described so far corresponds to the expectations set before given that the estimator Diff-in-Diff turns out to be significant and negative, as it is possible to see from Table 1.6 below. This turns out to be a first check attesting that the deregulation implemented through the decree-law which has increased the number of pharmacies has actually decreased the time taken to graduate.

Table 1.6 - Linear regression with Diff-in-Diff estimation

```
. reg durata fuoricorso votolau giur etam anno_lau tempo#farmacia, cluster(anno_lau)
```

Linear regression

Number of obs = 2207  
F( 6, 6) = .  
Prob > F = .  
R-squared = 0.4682  
Root MSE = 1.3165

(Std. Err. adjusted for 7 clusters in anno\_lau)

	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
durata						
fuoricorso	1.78411	.0876623	20.35	0.000	1.569608	1.998612
votolau	-.0347348	.0053041	-6.55	0.001	-.0477135	-.0217561
giur	-.562595	.1146541	-4.91	0.003	-.8431435	-.2820465
etam	.2769944	.0482289	5.74	0.001	.1589826	.3950061
anno_lau	.1318236	.026807	4.92	0.003	.0662293	.197418
tempo#farmacia						
0 1	-.3352146	.1042203	-3.22	0.018	-.5902325	-.0801968
1 0	-.1622897	.1226708	-1.32	0.234	-.4624543	.137875
1 1	-.7014324	.1040292	-6.74	0.001	-.9559828	-.4468821
_cons	-263.2527	53.56601	-4.91	0.003	-394.324	-132.1814

Despite estimation through the “Difference in Difference” model turns out to be not only significant, but also negative as expected, the empirical evidence cannot stop at the analysis of this model alone, since although it is easy to use, the Diff-in-Diff estimator has some limitations. The main of these limitations is that there is no way to prove that the result just obtained is actually different from what would have been obtained in absence of treatment. In fact, the model only suggests that there is a difference in the duration of studies of pharmacy students, but does not specify whether this difference is really due to the effect of deregulation or if it would have been present even in the absence of the aforementioned treatment.

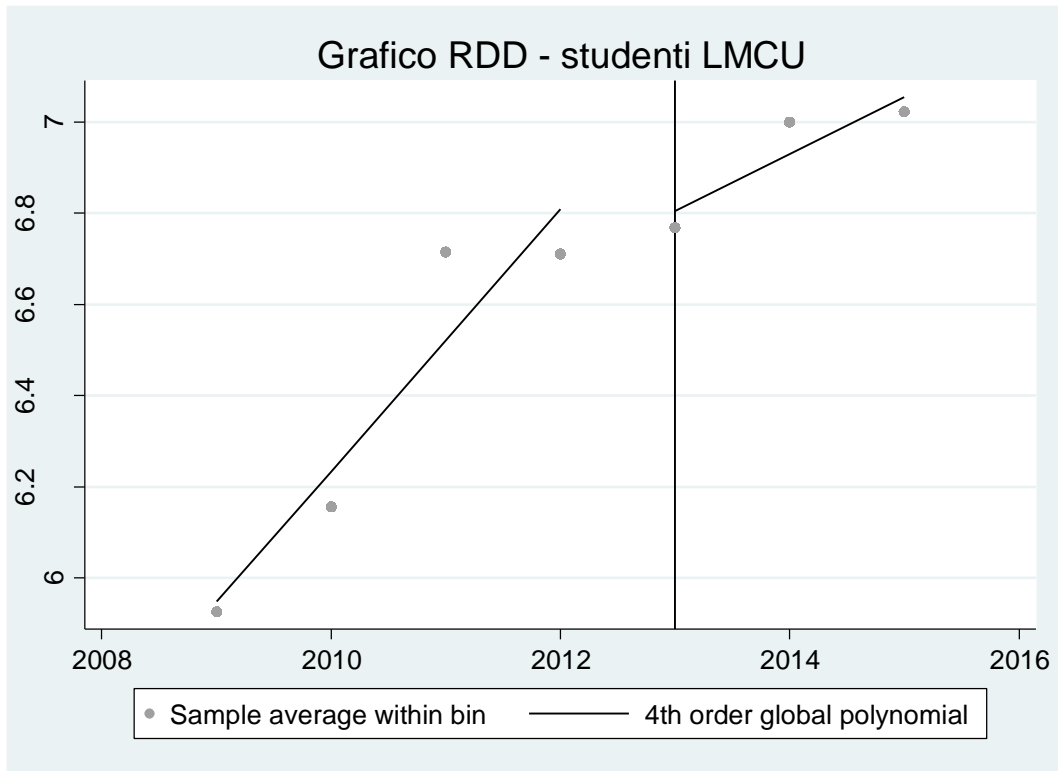
### ***1.3.2.2 Regression Discontinuity Design***

As highlighted in the previous paragraph, the Difference-in-Difference model, used as the first step of empirical evidence, has some limitations. It is to fill these limits that it was decided to implement another model, more complete than the previous one. The model chosen is the Regression Discontinuity Design. The analysis with this model goes through two phases: initially the RDD graph will be analyzed, since is easier to read, the model regression will then be implemented to verify that the results visible in the charts are meaningful.

The Regression Discontinuity Design is an almost experimental estimation technique, used in statistics, econometrics, political science, epidemiology and other fields, to evaluate the effectiveness of a treatment going to compare the phases before and after the test, isolating random effects by assigning a threshold value, above and below the time of administration of the intervention. Going subsequently to estimate the observations near the threshold it is possible to estimate the effect of the treatment.

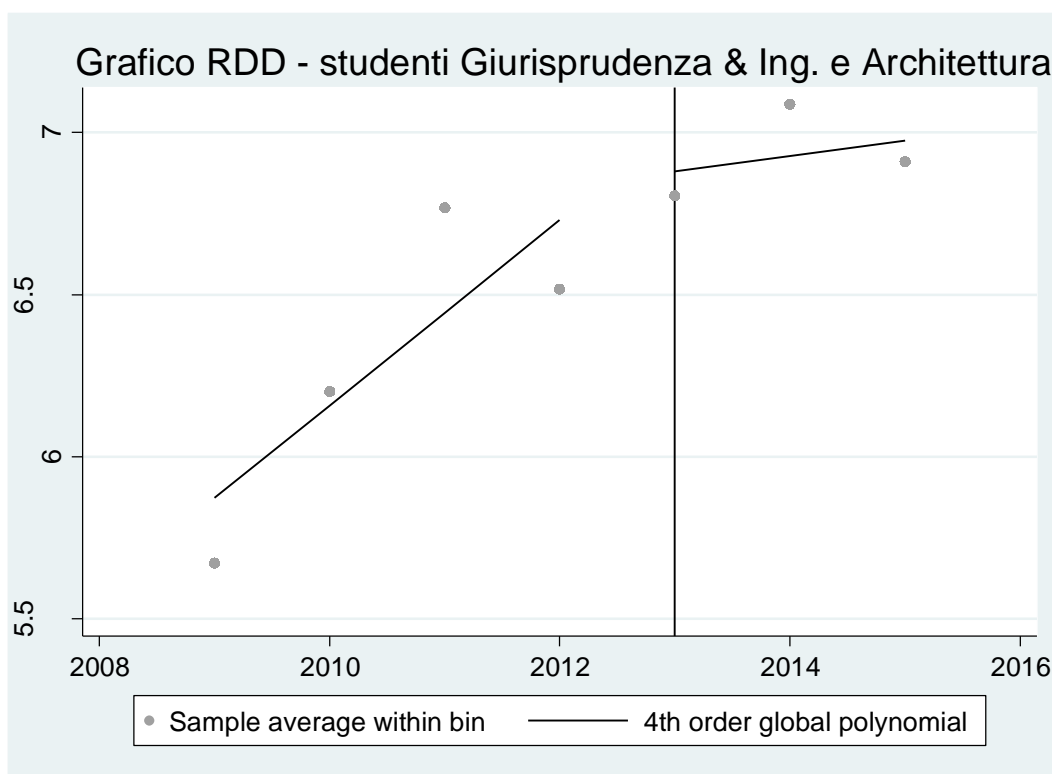
The RDD charts that will be illustrated from here have been built with the use of the software "STATA", using two variables of interest: on the ordinate axis there will be the variable "duration", while on that of the abscissa the variable "anno\_lau". Both variables were also present in the Diff-in-Diff model, and as described in Table 1.5, the former represents the time taken by the student to graduate, while the latter shows the year in which the student graduated. Finally, to complete the chart it is important to choose the point of "*cutoff*", which in the present case corresponds to the year 2013, which represents the year chosen as the time when the treatment showed its effect on students enrolled at the University of Calabria. For greater completeness of treatment the graphical analysis was first carried out for the total of the dataset (Table 1.7), later for the control group, represented by students enrolled in law and engineering (Table 1.8), for the treatment group, i.e. students enrolled in the pharmacy course (Table 1.9) and finally for pharmacy students who are enrolled as "out-of-time" (Table 1.10).

Table 1.7 - RDD chart for all the students present in the dataset



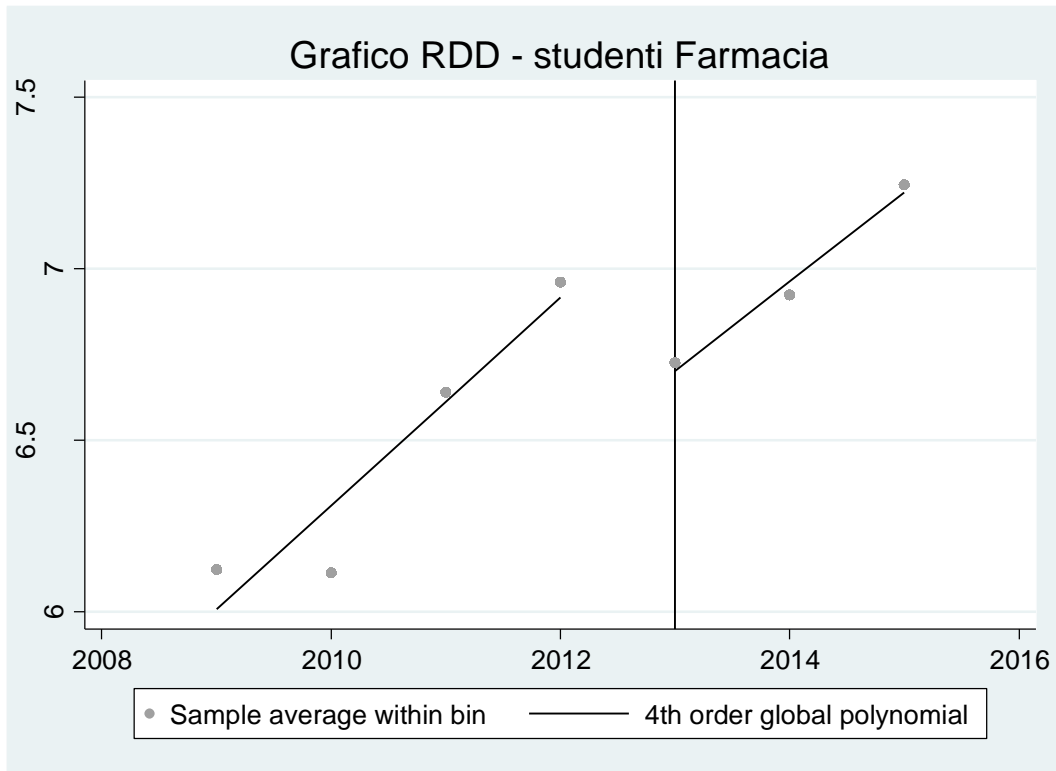
From this graph it is possible to notice the presence of a growing trend for all the years taken into account. The vertical line, which represents the point of “*cutoff*”, divides the two periods taken into account. In this chart there is no jump or change in trend, but only a slight flattening of the trend that remains growing. Because this chart represents the entire dataset, it is easy to imagine to find a growing trend in the following charts as well.

Table 1.8 - RDD chart for students enrolled in Law and Engineering



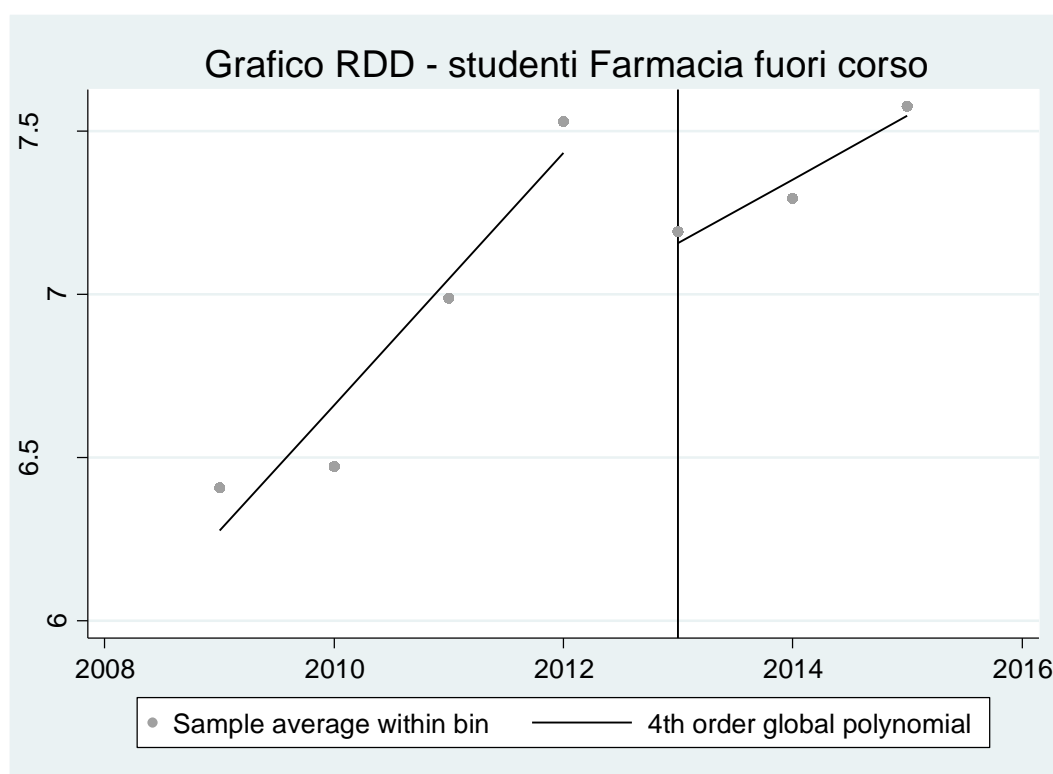
In this second graph as well, the trend remains of a growing type, the only difference that can be found between the two periods separated by the “*cutoff*”, is a flattening of the trend. It is therefore clear that as regards the students enrolled in the faculties of law and engineering, there are no tangible differences between the students who graduated in 2012 and those who graduated in 2013.

Table 1.9 - RDD Chart for students enrolled in the faculty of Pharmacy



In this graph, which takes into account only students enrolled in the faculty of pharmacy, there is an important difference compared to the graphs described so far. It is evident that between the year 2012 and 2013 there is a real jump in terms of the average duration used by students to graduate. Although the trend remains increasing throughout the period under analysis, the average duration decreases drastically during 2013, which is precisely the year chosen for the “*cutoff*”, that is, the year in which it was thought that the decree-law that had increased the number of pharmacies in Italy, could show its effects on university students. This graph represents a positive feedback in the work of this thesis, since it confirms and reinforces the concept that had been expressed through the analysis of the Difference-in-Difference estimator. There is therefore a confirmation that the average duration of the course of study has actually decreased for students enrolled in the Pharmacy course, meanwhile it has remained unchanged for students enrolled in other courses.

Table 1.10 - RDD chart for students enrolled as out of course at the faculty of Pharmacy



Finally, for completeness of treatment it was decided to verify if this effect was also found for students enrolled as out of course to the Faculty of Pharmacy. For this reason it was decided to shape a fourth graph that concerns the students mentioned above. As for all Pharmacy students, the effect is the same: a jump that represents a sudden decrease in the duration of the course of study, in the year following the issuance of the decree-law of reference.

As explained at the beginning of the paragraph, once the graphic analysis has been carried out, it is now necessary to verify the significance of this effect. To do so it was decided to use RDD regression. It is good to specify that although it is possible to make this type of estimate also with the "STATA" software, in this case it was not possible to use this software because the variable "anno\_lau", is discontinuous. For this reason it was decided to continue with the analysis using the software "R", with which it is possible to estimate an RDD regression in the presence of discontinuous variables. To be sure that the effect is significant only for students enrolled in the Pharmacy course, three regressions have been carried out, one for each faculty in the dataset. The results of these regressions are visible in the tables below.

Table 1.11 - Result of the RDD estimate for students enrolled in Law

```
Call:
RDHonest(formula = durata ~ anno_lau, cutoff = 2013, M = 0.017,
  kern = "uniform", opt.criterion = "FLCI", sclass = "H")

Inference by se.method:
  Estimate Maximum Bias Std. Error
nn -0.02846613   0.04399951  0.2381458

Confidence intervals:
nn  (-0.5030834, 0.4461512), (-0.4641806, Inf), (-Inf, 0.4072484)

Bandwidth below cutoff: 4
Bandwidth above cutoff: 4 (Bandwidths are the same)
Number of effective observations: 253.2662
```

As can be seen from the part highlighted in the figure concerning law students, the confidence interval ranges from -0.5 to 0.44 going through 0, resulting not significant, and confirming what we saw in the RDD chart (Table 2.8).

Table 1.12 - Result of the RDD estimate for students enrolled in Engineering

```
Call:
RDHonest(formula = durata ~ anno_lau, cutoff = 2013, M = 0.036,
  kern = "uniform", opt.criterion = "FLCI", sclass = "H")

Inference by se.method:
  Estimate Maximum Bias Std. Error
nn -0.3770536   0.07471514  0.3323404

Confidence intervals:
nn  (-1.044564, 0.2904565), (-0.99842, Inf), (-Inf, 0.2443128)

Bandwidth below cutoff: 4
Bandwidth above cutoff: 4 (Bandwidths are the same)
Number of effective observations: 62.0527
```

Also in this case, analyzing the estimate obtained for students enrolled in the engineering course, the result is the same as in the previous estimate: not significant, as it was already assumed by observing the RDD graph (Table 1.8).

Table 1.13 - Result of the RDD estimate for students enrolled in Pharmacy

```
Call:
RDHonest(formula = durata ~ anno_lau, cutoff = 2013, M = 0.021,
          kern = "uniform", opt.criterion = "FLCI", sclass = "H")

Inference by se.method:
      Estimate Maximum Bias Std. Error
nn -0.4978493    0.05590786  0.2177034

Confidence intervals:
nn (-0.9382467, -0.05745195), (-0.9118474, Inf), (-Inf, -0.08385122)

Bandwidth below cutoff: 4
Bandwidth above cutoff: 4 (Bandwidths are the same)
Number of effective observations: 284.6558
```

Finally, making the estimate only for students enrolled in pharmacy, we obtain a confidence interval that varies from -0.93 to -0.05, not passing through zero, and thus being significant. Estimates made on the software "R" using the method of Regression Discontinuity Design have confirmed the results obtained initially both with the Difference-in-Difference method, both with RDD charts. It can therefore be confirmed that, the year following the issuance of the decree-law that deregulated the professional order of pharmacists, it was possible to observe a sudden decrease in the duration of the course of study of university students who attended the Faculty of Pharmacy, in contrast to the growing trend observed for the rest of the years. The same effect was not found for those students who were enrolled in another 5-years master's degree program.

### ***1.3.2.3 Effect on degree mark***

For the sake of completeness of discussion, it was decided to verify whether the greater speed with which pharmacy students graduated in 2013 had a negative effect on their performance and consequently on the final degree mark. The procedure used to carry out this analysis is the same as that used for the verification of the main hypothesis. The first estimate was made using the Difference-in-Difference method, and the result is shown in the Table 1.14.

Table 1.14 - Linear regression with Diff-in-Diff estimation on graduation grade

```
. reg votolau fuoricorso durata giur etam anno_lau tempo#farmacia, cluster(corsb)
```

```
Linear regression                               Number of obs =    2207
                                                F( 5,    5) = .
                                                Prob > F      = .
                                                R-squared    = 0.2013
                                                Root MSE    = 6.2743
```

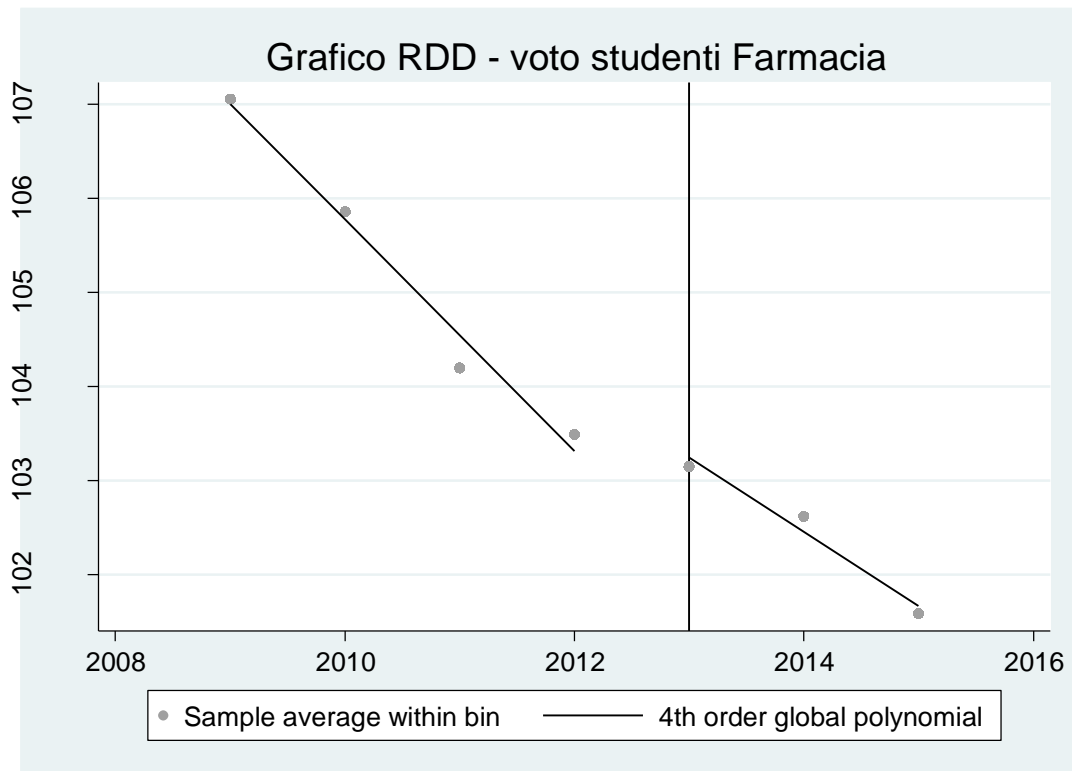
(Std. Err. adjusted for 6 clusters in corsb)

votolau	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
fuoricorso	.0962493	1.606977	0.06	0.955	-4.034617	4.227115
durata	-.7889399	.2362183	-3.34	0.021	-1.396158	-.1817213
giur	-4.200224	.1175694	-35.73	0.000	-4.502446	-3.898003
etam	-.6663299	.1475354	-4.52	0.006	-1.045582	-.287078
anno_lau	-.279391	.2348351	-1.19	0.288	-.8830538	.3242717
tempo#farmacia						
0 1	-3.346899	1.744162	-1.92	0.113	-7.830409	1.136611
1 0	.7022948	.7070337	0.99	0.366	-1.115193	2.519783
1 1	-4.16545	1.936417	-2.15	0.084	-9.143168	.8122668
_cons	692.6634	476.2932	1.45	0.206	-531.6873	1917.014

From the results of the estimate indicated in the figure it is clear that there would not seem to be a significant difference in the degree grade between the periods before and after the treatment. As previously described though, although this method is easy to apply the result obtained does not explain whether this difference is actually due to the treatment, or if it would in any case be present in the regression even if the treatment had not been there.

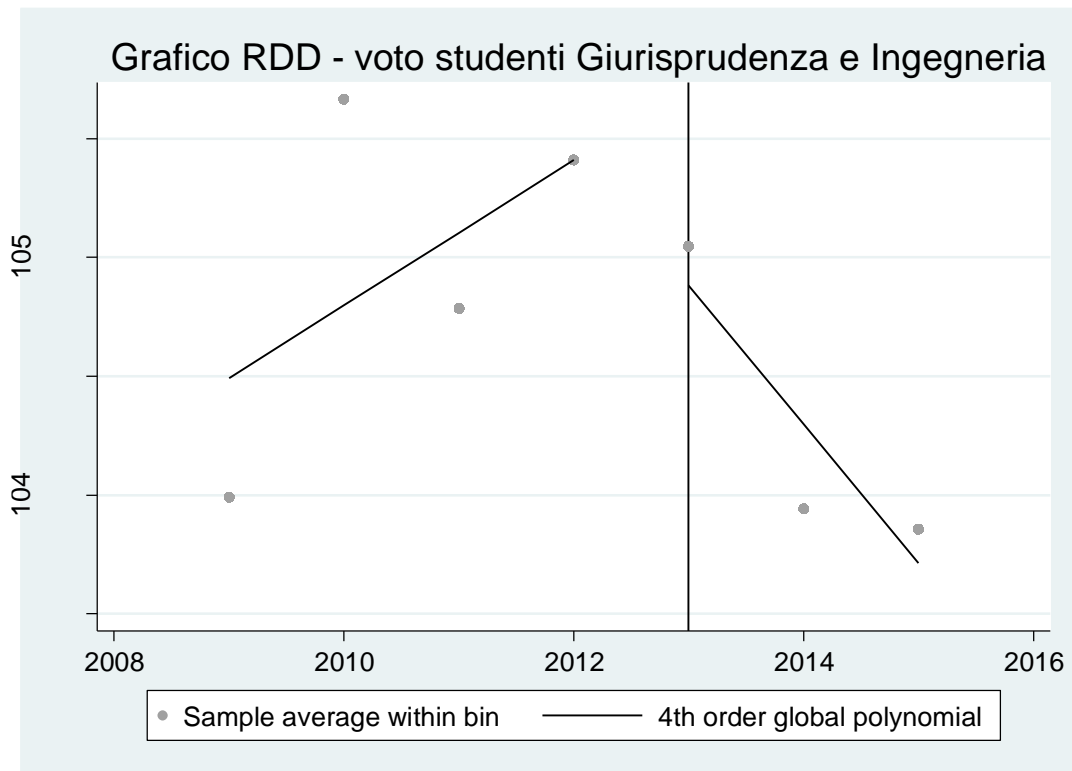
For this reason , the RDD graph was implemented, not only for students enrolled in the pharmacy course, but also for those enrolled in the other faculties.

Table 1.15 - RDD graph on the grade of Pharmacy students



As you can see from the graph above, over the years the graduation grade has had a decreasing trend, which has not undergone jumps or changes in trends between 2012 and 2013 which are the reference years.

Table 1.16 - RDD graph on the grade of students of Law and Engineering



Unlike the graph obtained for students enrolled in the pharmacy course, in this graph we can see a real change in trend between the pre-treatment and post-treatment period. Of course it is plausible to assume that this trend reversal is not due to the issuance of the decree-law, but rather to another event that is outside the field of interest of this thesis. Finally, to obtain further evidence of what has been written, as done for the analysis on the duration of the studies, the RDD estimate is used.

Through the software "R" are carried out a regression for pharmacy students and another one for law and engineering students, obtaining the estimates shown in the figures below.

Table 1.17 - RDD estimate on the grade of Pharmacy students

```
Call:
RDHonest(formula = votolau ~ anno_lau, cutoff = 2013, M = 0.021,
  kern = "uniform", opt.criterion = "FLCI", sclass = "H")

Inference by se.method:
  Estimate Maximum Bias Std. Error
nn 1.160858    0.05590786    0.9183521

Confidence intervals:
nn (-0.6424098, 2.964126), (-0.4056047, Inf), (-Inf, 2.727321)

Bandwidth below cutoff: 4
Bandwidth above cutoff: 4 (Bandwidths are the same)
Number of effective observations: 284.6558
```

Table 1.18 - RDD estimate on the grade of Law and Engineering student

```
Call:
RDHonest(formula = votolau ~ anno_lau, cutoff = 2013, M = 0.022,
  kern = "uniform", opt.criterion = "FLCI", sclass = "H")

Inference by se.method:
  Estimate Maximum Bias Std. Error
nn -0.8356476    0.05564418    0.7906352

Confidence intervals:
nn (-2.389095, 0.7177992), (-2.191771, Inf), (-Inf, 0.5204757)

Bandwidth below cutoff: 4
Bandwidth above cutoff: 4 (Bandwidths are the same)
Number of effective observations: 317.8648
```

Analyzing the results obtained for the two regressions we see that both are not significant. In both cases there is no substantial difference in the degree mark between the year 2012 and 2013, which are the years taken into account in the analysis. Therefore, the greater speed with which students enrolled in the pharmacy course graduate does not come at the expense of their university performance.

## 1.4 Conclusion

In the last years the low competitiveness of the Italian system is increased, showed the weakness and the parts in which there is the needed of a development, to reach the goal of a real growth. One of the focus point of this development is the labour market. For this reason different studies have tried to search for a solution. Some of them, are focused on the human capital as a engine for the restart. Another focus point is the liberalization, namely the idea that improving the competitiveness and reducing the entry-barriers in the market it is possible to increase the growth of the country. Even if with this approach the big industries are favoured, the advantage for the entire system is undiscussed.

In this chapter, thanks to the results showed before, another possibility is pointed out: improving the human capital through a reorganization of the labour market. Being more specific, being faster in reaching the degree is viewed as an improving of the human capital, that leads to having younger workers with increased room for improvement.

For what concern the reorganization of the market, this is guaranteed from the liberalization, that has lead to an increase in number of pharmacies in Italy. For the students this means having more probability to find a job after the degree. In other words, this project analyse, with positive output, the possibility to use the liberalization to generate a movement in the demand curve of the labour market, that could produce, in turn, an improvement in the time of degree of the universities' students, as its new-entry in that market. Moreover, as highlighted in the paragraph that analyse the effect on the degree mark, the increase in speed is not traduced in a decrease of the mark. This means that the students did not choose to give up on the mark in favour of the speed, but there were an all-around improvement. To sum up, after the liberalization there are workers with the same skill level, but younger than before.

In the end, is important to point out that in 2013 in the Calabrian region, as in the entire Italy as well, there were not new pharmacies. In fact, only between 2015 and 2016 there was an increase in the number of pharmacies because of the new rules. This means that the improvement in human capital is not due to something that the students have actually seen, but just because of their future prospective about the new law. This remind the thought of the Nobel prize for economy in 2017, Richard Thaler, the author of the “nudge”, a work based on the behaviour economy. According to this theory, since the humanhood does not have a

perfect knowledge of everything, take decision based on ethical and social factors; for this reason is important to take into account some psychological elements in the economics analysis. To sum up, is important to search for solutions for the improvement of the human capital, not only from an economic point of view, but also enriching the life itself of the people, that is one of the goal that the economy arise.

## 1.5 References

Aina, C. e Pastore, F. (2012), «Delayed Graduation and Overeducation: A Test of the Human Capital Model versus the Screening Hypothesis», IZA Discussion Papers, n. 6413

Becker, S. (2006), «Introducing Time-to-Educate in a Job Search Model», Bulletin of Economic Research, 58(1): 61-72

Bound, J., Lovenheim, M.F. e Turner, S. (2010), «Increasing time to baccalaureate degree in the United States», National Bureau of Economic Research (NBER), Working Papers, n. 15892

Bound, J. e Turner, S. (2007), «Cohort Crowding: How Resources Affect Collegiate Attainment», Journal of Public Economics, 91, 877-99

Brodaty, T., Gary-Bobo, R.J. e Prieto, A. (2008), «Does Speed Signal Ability? The Impact of Grade Repetitions on Employment and Wages», Center for Economic Policy Research (CEPR), Discussion Papers, n. 6832

Coin, F. e Sylos Labini, F. (2013), «Tasse universitarie: i numeri di Ichino e Terlizzese», <http://www.scienzainrete.it/contenuto/articolo/tasse-universitarie-numeri-di-ichino-e-terlizzese/>

Giannelli, G. e Monfardini, C. (2000), «Young Adults, Family and the Labour Market: An Empirical Analysis of Human Capital Investment Decisions», International Journal of Manpower, 21(3-4), 227-45

Giannelli, G. e Monfardini, C. (2003), «Joint Decisions on Household Membership and Human Capital Accumulation of Youths: The Role of Expected Earnings and Labour Market Rationing», Journal of Population Economics, 16(2), 265-85

Meloni, M. (2012), «Ma alzare le rette non risolve il problema», <http://www.lavoce.info/malzare-le-rette-non-risolve-il-problema/>

Pietro Garibaldi & Francesco Giavazzi & Andrea Ichino & Enrico Rettore, 2012. "College Cost and Time to Complete a Degree: Evidence from Tuition Discontinuities," *The Review of Economics and Statistics*, MIT Press, vol. 94(3), pages 699-711, August

Realfonzo, Riccardo. (2013). Deregolamentare per crescere? EPL, quota salari e occupazione, *Rivista giuridica del lavoro*, 2013, n. 3, pp. 487-502. *Rivista giuridica del lavoro*

Schivardi, F. and Viviano, E. (2011), Entry Barriers in Retail Trade. *The Economic Journal*, 121: 145-170

Spence, M. (1973), «Job Market Signalling», *Quarterly Journal of Economics*, 87(3), 355-74

T. Boeri, Enforcement of employment security regulations, on-the-job search and unemployment duration, in *European economic review*, 1998, vol. 43, pp. 65-89

T. Boeri, P. Garibaldi, Two tier reforms of employment protection: a honeymoon effect?, in *Economic journal*, 2007, vol. 117, pp. 357-385; T. Boeri, G. Nicoletti, S. Scarpetta, op. cit.; L. Pieroni, F. Pompei, Labour market flexibility and innovation: geographical and technological determinants, in *International journal of manpower*, 2008, vol. 29, n. 3, pp. 216-228

## **CHAPTER 2**

# **The Impact of Reducing barriers to Entry into Professions on job satisfaction: The Case of Pharmacists**

### **Abstract**

A different number of research works analyse the job-satisfaction and its correlation with age, gender, and others. In this study the main idea is to link the job-satisfaction with the liberalization of some professions in Italy. The satisfaction in this work is analysed using an ordered variable from 1 to 5. This study uses an Italian dataset of workers from 2016 to 2018, focusing on pharmacist as a treatment group and lawyer, engineer, and architect as a control group. The study is split in three parts: in the first one we analyse the job-satisfaction; in the second one we analyse the income-satisfaction; in the last part, we try to find what influenced the job-satisfaction. In the end, our study finds that pharmacists have a higher level of job-satisfaction after the increase of the number of pharmacies among Italy.

## 2.1 Introduction

The goal of this study is to show whether the reduction of entry barriers in the pharmacies market in Italy can affect workers' satisfaction. During this work, the job satisfaction is measured through a 5-levels variable. More specifically, the study is focused on the possibility that pharmacists' satisfaction will rise after the increase of the number of pharmacies. In fact, the previous research on the job satisfaction were focused on the differences among gender or age or other demographical variables and specific job factors, to show how these aspects could influence the job satisfaction. For this reason, the decision of analyse the difference in a specific group of workers, seems to be an interesting focal point. Moreover, nowadays the topic about job satisfaction is becoming more important.

The main idea is to take in account Italian workers from a specific dataset: the Istat data<sup>1</sup>. Istat is the Italian institute of statistic that collects a different kind of data from the Italian populations, and it is very useful because it is possible to work with his own dataset. For what concern the data analysed in this study, it contains information on the workers from all Italy. The information on these workers are about their socio-economics background, on their families, where they live and work and so on. The main information that are taken from this dataset is the level of job satisfaction. It is important to analyse their satisfaction as an index of their accomplishment after the degree. Moreover, the human capital is a very important indicator for the growth of a country, and this is another reason why is important to analyse their satisfaction.

The idea behind this project is started from a previous work (Ordine, Rose and Fasano, 2021) in which the same reform is used as a principle for the decrease of the time to degree of pharmacist's students. Following the same criteria, the question now is: the reform helped students to be faster, did it affect pharmacists' workers as well?

In the second chapter, after this introduction, we provide a literature review; this chapter is split in two parts: the first one is focused on the "job satisfaction", the second one highlights the "entry barriers reduction". Below, in the third chapter there is the main body of this study; this part is divided in three sub-chapter: the presentation of the methodology, the descriptive

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<sup>1</sup> <https://www.istat.it/en/>

statistics, and the results obtained using the STATA software and highlighted using graphs. Finally, we conclude.

## **2.2 Literature review**

### **2.2.1 Job satisfaction**

Nowadays the job satisfaction is becoming a very important topic and an index as well, to evaluate the quality of life. In fact, from 2010 the numbers of studies which tried to analyze this phenomenon grew up (see *inter alia* Clark et al. 1996, Mishra 2013) trying to search for correlations with several factors. One of the oldest studies is the one of Van et al. (2003), who identify some of these factors, as financial reward, promotion, autonomy, workload, and others. Moreover, for what concern more recent studies, according to Shahzad et al. (2010) remuneration and workload play an important role in the job satisfaction. Lastly, according to Mishra (2013) the factors influencing the satisfaction of workers are split in three groups: individual characteristic, specific job factors, and group relationship outside the job. In this job, because of the dataset, we are taking in account for the analysis the formers (as age, gender, education, etc...) and the seconds (as type of works, skill required, occupational status, etc...).

First, we focus on the individual characteristics and how these could affect the job satisfaction. García-Bernal et al. (2005) points out that man and woman use the same index to explain their own job satisfaction, but the importance that they give to each index is not the same. Another characteristic is analyzed from Clark et al. (1996) who find that age-satisfaction correlation is U-shaped. The explanation can be associated with the role of individual's expectations about the career. On the other hand, is important to underline that a lot of studies were conducted about this correlation and different results are showed in each paper. For example, Ghazzawi (2011) find no correlation between age and job satisfaction for the IT professional sector in US. For the reasons pointed out before, is important to keep in mind that job satisfaction is not an easy topic and nowadays there are plenty of papers that associated the job satisfaction to different individual characteristics and all of these works give a distinct importance to each characteristic.

For what concern the specific job factors, it is easier to identify some correlations. Meanwhile different studies evidence how the job security and the earning affect the job satisfaction, as pointed out from Nadeem (2010), differently from what could be the main thought, the salary is not the main factor. In fact, according to Awang and Ahmed (2010) remuneration has a lower correlation with job satisfaction than other factors. Moreover, according to Danish and Usman (2010) working environment is strictly related with job satisfaction.

### **2.2.2 Reducing entry barriers in the professional activities**

Before to highlight the main part of this work, it is important to analyse the literature about professional corporations<sup>2</sup>. The main reason for the existence of entry barriers is the idea to reduce the problem of asymmetric information. Reducing this problem brings to a more efficient protection to the customers from the possibility of receiving a lower quality service. On the other hand, different studies show how entry barriers in the market brings to some issues. According to Sadun (2008) a rigid regulation reduces employment growth in UK. A similar result is showed from Schivardi e Viviano (2010) who evidence how entry barriers are correlated with lower productivity and higher prices also in Italy. Closer to the topic of this paper, Schaumans and Verboven (2008) demonstrate how the strictly regulation of pharmacies in Belgium have reduced the number of pharmacies and reducing the barriers would lead to an increase of benefits for the consumers.

After the discussion above, it is evident that research, so far, has pointed out that there are different benefits in reducing entry barriers to the market or to the professional activities. For this reason, can be important to investigate the same topic in a different way: trying to understand if reducing entry barriers can affect the job satisfaction as well.

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<sup>2</sup> The Professional Qualifications Directive 2005/36 of the European Commission defines “Regulated professions” as professional activities, access to which or the pursuit of which is subject (by virtue of legislative, regulatory, or administrative provisions) to the possession of specific professional qualifications.

## 2.3 Methodology

### 2.3.1 Data

The data used in this work is from an Italian dataset which contain information about workers. The dataset contains a large amount of information on workers, all over Italy, interviewed between 2016 and 2018. The choice of this period is due to the fact that is necessary to avoid the 2015 and the 2020 for similar reasons. The former year, and the years before as well, could bring some problem in the data because in that period Italy was still recovering from a degrowth moment. Similarly, taking in account the 2020 means get into the data the period in which the CoVid-19 problem started with all its problem. For what concern 2019, it could be helpful to expand the data to this period as well, but the variables are not the same and, more important, one of the most important variables is not in that. This very important variable is the one named “c16\_c”, which is the ATECO<sup>3</sup> code. Thanks to this information is possible to define the treatment group. In fact, every job has a correspondent value; for example the code for the pharmacists, who are the treatment group, is “4773”. Moreover, the dataset contains both occupied and unoccupied people. Therefore, the latter are not included in the dataset used for this project.

The dataset contains a big number of variables: there are more than 400 variables. Because of this large number, can be useful to spit all these variables in different groups to understand in a clearer way which of these can be useful for this project. There are variables about:

- Workers personal information (age, sex, place of residence, nationality, etc...)
- Employment and education status (job and type of degree)
- Work information (earing, hours of work, etc...)
- Satisfaction of the workers

For this work the more relevant variables are those that show the type of job and the information about it. Moreover, the variable about the job satisfaction is the most important variable and is the one that is used as dependent variable; the name of this variable is “jobsat” that represent the level of satisfaction, that is how spitted in five levels, from “not satisfied” to “very satisfied”.

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<sup>3</sup> Since 2008 the ISTAT, which is the Italian institute for statistic, use the ATECO code as a classification of economics activities. This codification is the Italian version of the European nomenclature published on the Official Journal on 20 December 2006.

The dataset contains 248.899 workers and there are plenty of different jobs. Moreover, just little part of observed people is unoccupied, but these observations are not taking in account, due to the fact that in this study the focus of the analysis is about workers.

### **2.3.2 Models**

This study examines the relationship between the increase of the number of pharmacies and the job satisfaction of Italian pharmacists. This study uses two methods: linear regression model and ordered probit regression. The idea to use these methods come from other studies that used the same methodology to explore the same field, as Clark et al. (1996). That study tries to understand the factor that affect the workers' satisfaction. Moreover, using two methods is useful to analyse two different dependent variables, since in this project is used first an ordered variable and then a continuous variable.

The methods are split in three different sections, depending on the dependent variable that is used. In the first section the dependent variable shows the level of the job satisfaction ("jobsat"). The model of this section is the Ordered Probit regression. The choice to use this method is almost compulsory because the variable is ordinal; more specifically the dependent variable is spitted in five levels of satisfaction, from 0, which means "not satisfied", to 5, which means "very satisfied". Moreover, the choice of the model is also due to the fact that is used by Clark et al. (1996) to analyse people' satisfaction in relation with their attributes, that is something similar to this study.

In the second section the dependent variable is different; instead of an ordinal variable there is a continuous variable. This variable represents the earnings of the workers ("logincome"). The test used in this second part is the Difference-in-Differences.

Lastly, in the third section, the dependent variable is a dummy variable, which can assume value 1 if the interviewed considers easy to find the same job he is doing or 0 otherwise. The test used is the Probit regression.

### 2.3.2.1 Ordered Probit Regression with prediction

Since in the first part of the analysis the dependent variable is ordinal, it is possible to use the ordered probit regression model. Moreover, since in other research, as Clark et al. (1996), this kind of regression is used to analyse the job satisfaction, can be helpful use the same methodology to explore the same concept. Using the variable that shows the level of satisfaction (“jobsat”) as dependent variable, the goal of this model is to establish the probability with which one observation can generate one value of the dependent variable rather than the other values. In this specific case, this model points out the probability for the pharmacist to be more or less satisfied. Moreover, using the “margin” command in Stata, is possible to check the changing of the probability to be for each level of satisfaction. This is useful for a deeper analysis.

The equation of this regression is given by:

$$Y^* = \beta' X_i + \varepsilon_i$$

Where  $Y^*$  is the k-levels dependent variable which in this case is a splitted in five levels,  $X_i$  is a vector of parameters, that will be pointed out in the next chapter, to be estimated and  $\varepsilon_i$  is the stochastic error term. Each category k is observed when the continuous response falls in the k-th interval, so that the probabilities for each response will be given by:

$$\Pr(Y = 0) = P(Y^* \leq 0) = P(\beta' X + \varepsilon_i \leq 0) = \theta(-\beta' X)$$

$$\Pr(Y = 1) = \theta(\delta_1 - \beta' X) - \theta(-\beta' X)$$

$$\Pr(Y = 2) = \theta(\delta_2 - \beta' X) - \theta(\delta_1 - \beta' X)$$

$$\Pr(Y = 3) = \theta(\delta_3 - \beta' X) - \theta(\delta_2 - \beta' X)$$

$$\Pr(Y = 4) = \theta(\delta_4 - \beta' X) - \theta(\delta_3 - \beta' X)$$

$$\Pr(Y = 5) = 1 - \theta(\delta_4 - \beta' X)$$

### 2.3.2.2 Difference-in-Differences

The Difference-in-Differences is used to show if a treatment is efficient or not. To do so, two groups are needed: a treatment group and a control group. In this study the treatment group is represented by the pharmacists, meanwhile the control group is represented by other workers

who belong to other professional corporations (e.g. engineer, architect, lawyer...). Moreover, it is important to split the time in two different moments: before and after the treatment. In this case the cutoff chosen between the two period is the third quarter of the 2017. The reason why this moment is chosen is because in that period the number of pharmacies in Italy increase in almost every region.

As written before, there are two binary variables: group (G) and time (T). These two variables can assume two values: G = 1 for the treatment group and 0 otherwise and T = 1 for the post-treatment and 0 otherwise. Now it is possible to define the treatment effect as:

$$\tau(T = 1, G = 1) = E[Y^1|T = 1, G = 1, X] - E[Y^0|T = 1, G = 1, X]$$

Where  $Y^1$  is the outcome with treatment and  $Y^0$  is the outcome without treatment and X is the vector of control variables. The observational rule for the outcome variable Y is

$$Y = (TG) \times Y^1 + (1 - TG) \times Y^0$$

The expected potential outcome  $Y^0$ , conditional on T, G and X is:

$$E[Y^0|T, G, X] = \alpha T + \beta G + X\theta$$

Where the time effect  $\alpha$  is constant for both groups and the group difference  $\beta$  is constant across time.

The expected potential outcome  $Y^1$ , conditional on T, G and X is:

$$E[Y^1|T = 1, G = 1, X] = \alpha + \beta + \tau(T = 1, G = 1) + X\theta$$

Because of what is written before, the treatment effect on the treated after the time of treatment is identified as:

$$\begin{aligned} E[Y|T, G, X] &= TG \times [\tau + \alpha T + \beta G + X\theta] + (1 - TG) \times [\alpha T + \beta G + X\theta] \\ &= \alpha T + \beta G + \tau TG + X\theta \end{aligned}$$

### **2.3.2.3 Probit Regression**

The Probit regression is a model in which the dependent variable is binary and can assume value as 0 or 1. To model the regression is used the cumulative standard normal distribution function  $\Phi(\cdot)$ . So, the model can be written as:

$$E(Y|X) = P(Y = 1|X) = \Phi(\beta_0 + \beta_1 X)$$

in which  $\beta_0 + \beta_1 X$  plays the role of a quantile  $z$ :

$$\Phi(z) = P(Z < z), \quad Z \sim N(0,1)$$

such that the coefficient  $\beta_1$  is the change in  $z$ , that is associated with a change of one unit in  $X$ . It is important to remind that despite  $X$  has a linear effect on  $z$ , because of the function  $\Phi(\cdot)$ , that is a nonlinear function, the link between the dependent variable and  $z$  is, in turn, nonlinear.

### 2.3.3 Results

Using the statistic software STATA, it was possible to point out the results of the models described previously. The results are showed in this order:

1. Ordered probit regression: using the job satisfaction (“jobsat”) as dependent variable to understand if there is an increase of this index for the pharmacists.
2. Difference-in-Differences model: used to determine if the increase of the number of pharmacies generate a statistically significant effect on the pharmacist earnings (“logincome”). Moreover, the same model is used to verify if the overtime hours (“ovtH”) are affected as well.
3. Probit model: as the previous model, this one is used to determine if the increase of the number of pharmacies leads to a decrease in the difficulty of find a job (“easyJob”) for the pharmacists.

These three models, even if are represented separated, should be analysed as a unique thing. That’s because the satisfaction could be affected from different variables. In fact, these models should be examined as two-steps of the same analysis: the first one is the principal and is used to figure out if there is a change in the satisfaction level. The others two are carried out to understand which variable can affect the job satisfaction.

Following the same order used before, the first model is the Ordered Probit Regression, and in the Table 2.1 below it is possible to see the STATA’s output.

Table 2.1 - Ordered Probit Regression output

jobsat	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
etam	-.034	.005	-6.69	0	-.043	-.024	***
etam2	.0002	.0000	6.18	0	0	0	***
male	-.041	.008	-4.88	0	-.058	-.025	***
stacim	.022	.004	5.50	0	.014	.029	***
logincome	.318	.019	16.95	0	.281	.354	***
loghours	-.05	.003	-18.00	0	-.055	-.045	***
ovtH	-.019	.001	-13.80	0	-.022	-.017	***
ovtH2	0	0	-3.18	.001	0	0	***
pospro	-.093	.007	-13.05	0	-.107	-.079	***
c16_c	0	0	31.28	0	0	0	***
c82	0	0	-5.58	0	0	0	***
exp	0	.001	-0.35	.724	-.003	.002	
parttime	-.089	.019	-4.80	0	-.126	-.053	***
detind	.077	.018	4.23	0	.042	.113	***
giur	-.268	.014	-19.20	0	-.296	-.241	***
ing	-.218	.014	-15.63	0	-.245	-.19	***
arc	.339	.012	27.75	0	.315	.363	***
comm	-.121	.138	-0.87	.382	-.392	.15	
doct	-.001	.02	-0.06	.952	-.04	.038	
dent	.027	.013	2.06	.04	.001	.052	**
REGION : 1	0	.	.	.	.	.	
2	-.032	.04	-0.80	.424	-.109	.046	
3	-.104	.025	-4.16	0	-.153	-.055	***
4	.189	.032	5.85	0	.125	.252	***
5	-.002	.039	-0.04	.969	-.078	.075	
6	-.069	.029	-2.36	.018	-.125	-.012	**
7	-.065	.032	-2.03	.043	-.128	-.002	**
8	.051	.044	1.17	.242	-.035	.137	
9	-.098	.025	-3.95	0	-.147	-.049	***
10	.188	.037	5.14	0	.117	.26	***
11	-.071	.022	-3.22	.001	-.115	-.028	***
12	-.122	.013	-9.06	0	-.148	-.095	***
13	-.393	.068	-5.76	0	-.527	-.259	***
14	.374	.036	10.37	0	.303	.445	***
15	-.342	.025	-13.74	0	-.39	-.293	***
16	-.217	.019	-11.36	0	-.255	-.18	***
17	-.045	.064	-0.69	.489	-.171	.082	
18	.185	.024	7.79	0	.139	.232	***
19	-.16	.032	-4.98	0	-.222	-.097	***
20	-.158	.023	-6.79	0	-.203	-.112	***
TRATT	.188	.018	10.25	0	.152	.224	***
cut1	-1.034	.231	.b	.b	-1.486	-.582	
cut2	-.551	.237	.b	.b	-1.016	-.086	
cut3	.339	.244	.b	.b	-.139	.818	
cut4	1.975	.24	.b	.b	1.505	2.445	
Mean dependent var		3.984	SD dependent var			0.790	
Pseudo r-squared		0.022	Number of obs			3889	
Chi-square		.	Prob > chi2			.	
Akaike crit. (AIC)		8432.211	Bayesian crit. (BIC)			8469.807	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

As is possible to see in Table 2.1, 22 variables were used to explain the model, just few of them is not statistically significant. In this regression the observations are clustered by kind of job (public job, contract job, self-employed, etc.). Taking in account the significant variables, the Table 2.1 gives some important information. As this Table suggests, since the dummy variable for the gender (“male”) has a negative coefficient, women are more satisfied than men about their job. Moreover, the variable that points out the age of the workers (“etam”) and the age squared (“etam2”) presents respectively a negative and a positive coefficient; that can be seen as a confirmation of some previous works (as Clark et al., 1996) about the U-shape of the age in relationship with the job-satisfaction. Also, in the regression there are some dummies variables that illustrate other professional orders, which are very important because, since they are the closer kind of job of the one analysed in this project, they represent the “control group. Most of these dummies variables present a negative coefficient, that means a major probability to be unsatisfied of the job.

Finally, analysing the most important variable for this study (“tratt”), looking the sign of the coefficient, it is possible to point out that pharmacists, after the opening of the new pharmacies, are more likely to be more satisfied, since the coefficient is positive. This result can be seen as a confirmation of the main idea that is the starting point of this project.

With this first output it is possible to make a statement about the sign of the coefficient and it is possible to analyse the effect of being or not a pharmacist. To analyse in a deeper way the effect on the dependent variable it was used the command “margin”; in this way it is possible to decompose the variable to understand not just the general effect of being or not a pharmacist, but the effect per each level of satisfaction as well. The output of this command is showed below.

Table 2.2 - Prediction output

Average marginal effects  
 Number of obs = 3,889  
 Model VCE : Robust  
 Expression : Pr(jobsat==1),  
 predict(outcome(1))  
 dy/dx w.r.t. : tratt

Delta-method						
	dy/dx	Std.Err.	z	P>z	[95%Conf.	Interval]
<b>tratt</b>	-0.007	0.001	-10.810	0.000	-0.008	-0.005

Average marginal effects  
 Number of obs = 3,889  
 Model VCE : Robust  
 Expression : Pr(jobsat==2), predict(outcome(2))  
 dy/dx w.r.t. : tratt

Delta-method						
	dy/dx	Std.Err.	z	P>z	[95%Conf.	Interval]
<b>tratt</b>	-0.010	0.001	-8.930	0.000	-0.012	-0.008

Average marginal effects  
 Number of obs = 3,889  
 Model VCE : Robust  
 Expression : Pr(jobsat ==3), predict(outcome(3))  
 dy/dx w.r.t. : tratt

Delta-method						
	dy/dx	Std.Err.	z	P>z	[95%Conf.	Interval]
<b>tratt</b>	-0.034	0.004	-9.200	0.000	-0.041	-0.027

Average marginal effects  
 Number of obs = 3,889  
 Model VCE : Robust  
 Expression : Pr(jobsat ==4), predict(outcome(4))  
 dy/dx w.r.t. : tratt

Delta-method						
	dy/dx	Std.Err.	z	P>z	[95%Conf.	Interval]
<b>tratt</b>	-0.006	0.000	-24.090	0.000	-0.006	-0.005

Average marginal effects  
 Number of obs = 3,889  
 Model VCE : Robust  
 Expression : Pr(jobsat ==5), predict(outcome(5))  
 dy/dx w.r.t. : tratt

Delta-method						
	dy/dx	Std.Err.	z	P>z	[95%Conf.	Interval]
<b>tratt</b>	0.056	0.005	10.480	0.000	0.046	0.067

This last output is in addition to the ordered probit regression, and it is helpful to understand which level of satisfaction are affected by the fact of being a pharmacist. The “dy/dx” column shows the marginal increase (or decrease) of the probability of being in each level of the dependent variable. So, the probability to be in the level 1, 2, 3 and 4 of satisfaction is lower for the pharmacists after the treatment, vice versa the probability for the same group of being in the level 5 (maximum level of satisfaction) is higher. To sum up, this last test confirms what was already shown with the previous tests: after the increasing of the number of pharmacies in Italy, in the third quarter of 2017, pharmacists are more satisfied of their job. Since both tests point out the same results, it is possible to be more confident on the conclusion.

After the first model, is important to try to give an interpretation to the reason why this result is obtained. To do so, in the next analysis other models are used in order to focus the attention on other variables: the continuous variables about the income (“logincome”) and the overtime hours (“ovtH”) and the dummy variable about the difficult of find a job (“easyJob”). These three variables are the dependent variables in the next models.

First of all, the income is analysed. As can be easy to imagine, the income is one of the most important indices to focus on when the satisfaction of the job is evaluated. Following the order of presentation of the models, Table 2.3 shows the STATA’s output of the Difference-in-Differences model, in which the dependent variable is the logarithm of the monthly earnings (“logincome”).

Table 2.3 - Difference-in-Differences Regression: "logincome"

<b>logincome</b>	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
etam	.014	.002	6.70	.001	.009	.019	***
etam2	0	0	-5.00	.002	0	0	***
male	.092	.003	27.35	0	.084	.101	***
stacim	-.004	.001	-2.56	.043	-.007	0	**
hours	0	0	4.81	.003	0	0	***
ovtH	.012	.001	14.49	0	.01	.013	***
ovtH2	-.001	0	-18.50	0	-.001	0	***
pospro	-.23	.005	-46.39	0	-.243	-.218	***
c82	0	0	32.06	0	0	0	***
exp	.001	0	3.07	.022	0	.001	**
c16_c	0	0	-59.48	0	0	0	***
parttime	-.428	.005	-85.70	0	-.44	-.415	***
detind	.119	.005	21.75	0	.106	.133	***
tistud	.01	.005	2.14	.076	-.001	.021	*
giur	-.097	.002	-50.28	0	-.102	-.093	***
ing	.151	.006	24.68	0	.136	.166	***
arc	-.207	.005	-43.21	0	-.219	-.195	***
comm	-.058	.011	-5.39	.002	-.085	-.032	***
doct	.153	.015	10.02	0	.116	.19	***
dent	.217	.01	22.79	0	.194	.24	***
REGION : 1	0	.	.	.	.	.	.
2	.066	.004	18.27	0	.057	.074	***
3	.055	.003	20.01	0	.048	.061	***
4	.116	.006	20.90	0	.102	.13	***
5	.017	.005	3.23	.018	.004	.03	**
6	.03	.009	3.43	.014	.009	.051	**
7	.011	.009	1.25	.257	-.011	.033	.
8	-.011	.009	-1.22	.268	-.033	.011	.
9	-.006	.016	-0.40	.706	-.045	.032	.
10	.011	.02	0.52	.619	-.039	.06	.
11	-.035	.021	-1.67	.147	-.086	.016	.
12	.017	.015	1.15	.296	-.02	.055	.
13	-.018	.008	-2.29	.062	-.036	.001	*
14	-.077	.009	-8.14	0	-.1	-.054	***
15	-.111	.004	-26.03	0	-.122	-.101	***
16	.017	.009	2.03	.089	-.004	.038	*
17	-.008	.008	-0.95	.381	-.028	.012	.
18	-.071	.004	-18.31	0	-.08	-.061	***
19	-.079	.01	-7.56	0	-.104	-.053	***
20	-.055	.004	-14.02	0	-.065	-.045	***
farm#tempo							
0 1	-.011	.002	-7.32	0	-.015	-.007	***
1 0	-.007	.007	-0.98	.364	-.025	.01	.
1 1	.044	.003	14.60	0	.037	.052	***
Constant	7.402	.034	219.04	0	7.319	7.484	***
Mean dependent var		7.265	SD dependent var			0.411	
R-squared		0.566	Number of obs			4024	
F-test		.	Prob > F			.	
Akaike crit. (AIC)		920.202	Bayesian crit. (BIC)			958.002	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

In this regression, as it is pointed out in the Table 2.3, the variables used are almost the same of the one used in the ordered probit regression presented in this project. Most of the variables are statistically significant. Focusing on the main point, in the regression there is an interaction between the variable “farm” and the variable “tempo”, this means taking into account the pharmacists after the treatment (the increase of the number of pharmacies in Italy). As is it possible to see, Table 3.3 pointed out some understandable conclusions: getting older (“etam” and “etam2”) and gaining experience (“exp”) leads to an increase of the retribution. Having a part-time job (“parttime”) means a lower retribution. Roughly interesting is the analysis about the overtime hours: meanwhile the coefficient for the variable “ovtH” is positive, the squared of the same variable (“ovtH2”) presents a negative coefficient; this leads to reverse U-shaped, in which having some overtime hours can help to increase the income, but too many overtime hours do not help to increase the salary. Focusing on the professional orders is possible to see how for lawyers, architects, and accountants the income is lower, vice versa for the others the earning is higher; for what concern the pharmacists, the coefficient is not statistically significative, but for the pharmacists after the second quarter of 2017, it become positive and significative. This means that after the opening of the pharmacies, their earnings are raised.

The next focus is on the overtime hours (“ovtH”) that represent the dependent variable in the Table 2.4.

Table 2.4 - Difference-in-Differences Regression: "ovtH"

ovtH	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
etam	.01	.01	1.09	.317	-.013	.034	
etam2	-.001	0	-4.77	.003	-.001	0	***
male	.084	.008	10.31	0	.064	.104	***
stacim	-.022	.003	-6.71	.001	-.03	-.014	***
hours	0	0	-10.12	0	0	0	***
pospro	-.175	.007	-23.51	0	-.193	-.157	***
c82	0	0	-0.72	.501	-.001	0	
exp	.035	.002	22.94	0	.032	.039	***
c16_c	0	0	-2.89	.028	0	0	**
parttime	-.206	.013	-16.05	0	-.237	-.174	***
detind	.203	.041	4.91	.003	.102	.304	***
tistud	.065	.015	4.33	.005	.028	.101	***
giur	-.416	.019	-21.80	0	-.463	-.369	***
ing	-.295	.014	-20.33	0	-.33	-.259	***
comm	-.441	.023	-19.01	0	-.497	-.384	***
doct	.562	.035	16.20	0	.477	.647	***
REGION : 1	0	.	.	.	.	.	
2	-.178	.024	-7.56	0	-.236	-.121	***
3	.475	.036	13.11	0	.386	.564	***
4	-.062	.023	-2.77	.032	-.118	-.007	**
5	-.097	.041	-2.37	.056	-.198	.003	*
6	.501	.05	10.09	0	.38	.623	***
7	.565	.055	10.32	0	.431	.699	***
8	.235	.042	5.57	.001	.132	.338	***
9	.097	.009	10.79	0	.075	.118	***
10	.313	.065	4.85	.003	.155	.471	***
11	.327	.051	6.40	.001	.202	.452	***
12	.127	.031	4.10	.006	.051	.203	***
13	-.236	.021	-11.44	0	-.287	-.186	***
14	.399	.041	9.81	0	.299	.499	***
15	-.049	.027	-1.86	.113	-.114	.016	
16	-.289	.023	-12.32	0	-.346	-.232	***
17	-.266	.028	-9.64	0	-.333	-.198	***
18	-.209	.027	-7.67	0	-.275	-.142	***
19	-.028	.079	-0.36	.732	-.221	.165	
20	-.003	.021	-0.14	.893	-.055	.049	
farm#tempo							
0 1	.091	.017	5.39	.002	.049	.132	***
1 0	-.212	.009	-23.39	0	-.234	-.19	***
1 1	-.473	.014	-33.18	0	-.508	-.438	***
Constant	-.16	.385	-0.42	.691	-1.103	.782	
Mean dependent var		0.457	SD dependent var			2.434	
R-squared		0.024	Number of obs			4024	
F-test		.	Prob > F			.	
Akaike crit. (AIC)		18489.514	Bayesian crit. (BIC)			18527.314	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

This regression is less significant for this project because, as is highlighted from Table 2.4, being in a professional order leads to a less time spent in overtime work. Focusing on other variables is possible to see how the age is not statistically significant, but the age squared is significant and negative, so it is possible to understand how older people are less likely to stay

at work after the normal schedule time. An interesting point is the fact that having a family (“stacim”) leads to reduce the overtime hours. Moreover, men (“male”) spend more overtime hours than women.

Last analysis is focused on the difficulty of find a job. Nowadays is a very interesting topic and the Italian government is working to find a solution to this problem. Find a job is becoming so hard that a lot of people end up accepting a job that is not linked with their studies. For this reason, it could be possible that workers can be happier when they find the job for which they studied in an easier way, instead of having some trouble to reach it. The results of this analysis are showed in Table 2.5.

Table 2.5 - Probit Regression: "easyJob"

<b>easyJob</b>	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
etam	-.068	.005	-14.08	0	-.078	-.059	***
etam2	.001	0	11.23	0	.001	.001	***
male	.022	.012	1.81	.071	-.002	.046	*
stacim	.096	.017	5.77	0	.063	.129	***
logincome	-.165	.015	-10.94	0	-.195	-.136	***
loghours	.111	.011	10.48	0	.09	.132	***
pospro	.001	.022	0.06	.951	-.041	.044	
c16_c	0	0	2.76	.006	0	0	***
c82	0	0	-1.78	.075	0	0	*
exp	-.01	.001	-7.08	0	-.013	-.008	***
parttime	-.089	.016	-5.47	0	-.121	-.057	***
detind	-.135	.034	-4.00	0	-.201	-.069	***
o	0	.	.	.	.	.	
ing	.65	.031	21.22	0	.59	.71	***
o	0	.	.	.	.	.	
comm	-.002	.027	-0.07	.942	-.056	.052	
doct	-.375	.012	-30.47	0	-.399	-.351	***
o	0	.	.	.	.	.	
REGION : 1	0	.	.	.	.	.	
2	-.318	.073	-4.34	0	-.461	-.174	***
3	.472	.076	6.21	0	.323	.622	***
4	.415	.073	5.68	0	.272	.558	***
5	.11	.08	1.36	.173	-.048	.267	
6	.398	.041	9.60	0	.316	.479	***
7	.314	.096	3.26	.001	.125	.503	***
8	.219	.056	3.91	0	.109	.329	***
9	-.126	.077	-1.63	.104	-.277	.026	
10	.228	.116	1.97	.049	.001	.455	**
11	-.21	.118	-1.78	.075	-.441	.021	*
12	-.054	.087	-0.62	.535	-.225	.117	
13	-.069	.188	-0.37	.713	-.439	.3	
14	.185	.074	2.48	.013	.039	.33	**
15	-.034	.065	-0.52	.6	-.161	.093	
16	-.622	.082	-7.60	0	-.783	-.462	***
17	.217	.075	2.89	.004	.07	.364	***
18	-.023	.061	-0.38	.706	-.142	.096	
19	-.007	.068	-0.11	.916	-.141	.126	
20	-.117	.06	-1.96	.05	-.234	0	*
tratt	.277	.019	14.82	0	.24	.313	***
Constant	1.035	.138	7.52	0	.765	1.305	***
Mean dependent var		0.065	SD dependent var			0.247	
Pseudo r-squared		0.075	Number of obs			3952	
Chi-square		.	Prob > chi2			.	
Akaike crit. (AIC)		1772.330	Bayesian crit. (BIC)			1816.304	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Since the dependent variable is dummy, in this model is pointed out how the independent variables influence the possibility that for the worker was easy to find the job (“easyJob”). Focusing on the main variable that shows if the worker is a pharmacist after the treatment (the increase of the number of pharmacies) or not (“tratt”), Table 2.5 shows that the sign is positive. This means that being a pharmacist after the reforms increase the possibilities to find a job in an easier way.

In conclusion, all the tests pointed out in this project were useful to confirm the main idea behind this study: after the increase of the number of pharmacies in Italy, due to a recent reform, pharmacists are more satisfied of their job. To understand in a better way this result, in this project is showed that the same group, after the treatment, has a higher income, and they found their job with less effort. Nothing can be said about the overtime hours, due to the fact that a less overtime hours is found for all the professional orders.

## **2.4 Conclusion**

In the previous work (Ordine, Rose and Fasano, 2021) is showed how the 2012 reform, which increased the number of pharmacies, affected the time to degree of the students who are enrolled in a pharmacy degree. That project was focused on the students because they are the future human capital in the job market and helping them in reach their degree in a faster way means give them a bigger potential growth in the work life. This is the reason why, after analysing their time to degree, is important to understand whether their hard work has a respective payoff in the job market or not. So, this is the main idea behind this project: evaluated if the pharmacists, after the effect of the reform, are more satisfied of their job. Otherwise, the fact that they reached the degree faster is useless if they are not satisfied.

As it was pointed out in the third chapter of this project, there is a difference between pharmacists and other jobs that belong to professional orders after the increase of the number of pharmacies in Italy. To be more specific, from the second part of 2017 the job satisfaction of pharmacists rises, meanwhile for lawyers, engineers, accountants and doctors the job satisfaction decreases. According to this result it is possible to say that the main goal of the project is reached. By the way, a deeper analysis can be helpful for a better comprehension of the topic. For this reason, three variable that could be linked to the level of satisfaction are

analysed: income, overtime hours and effort to find the job. In the third chapter is highlighted how two of these variables, after the opening of the new pharmacies, follow the same result of the first analysis: for the pharmacists the income increases, and the necessary effort to find the job decrease. Again, according to these results it is possible to say that the reform improved the quality of work and life of the pharmacists. These results are the second step of a bigger project, which started finding that pharmacist's students take their degree faster after the same reform analysed in this work. For this reason, the conclusions of this paper follow the same direction of the previous one: a single reform, designed to increase the competition, leads to a faster time to degree for students and an improvement in quality of life and work for the pharmacists. Both the consequences can be linked to one conclusion: an increase of the quality of human capital. In fact, a worker who is more satisfied of his job, probably will be a better and more efficient worker, increasing the productivity. Moreover, if it is easier to find a job, this means that probably the pharmacist will start his job in a younger age with a higher margin for potential growth. As a consequence of this analysis, there are some potential avenues for future research. In fact, a possible development for this study can be to analyse if the effect on the overtime hours is bigger if considering just the not paid overtime hours. Moreover, splitting the workers for groups of age could lead to another interesting point of view. In this way it can be possible to understand if the younger, who represent the weaker part of the human capital, can be helped to find a job that is strictly correlated with their studies.

To sum up, it is important to analyse in a deeper way this topic, in order to find other solutions, not just in the economic field, that can bring an improvement of the human capital and for the workers' life as well.

## 2.5 References

Awang, Z., & Ahmed, J. H. (2010). Modelling Job Satisfaction and Work Commitment among Lecturers: A Case of UiTM Kelantan. *Journal of Statistical Modeling and analysis*, 1(2), 45-59.

Clark, A., Oswald, A., & Warr, P. (1996). Is job satisfaction U-shaped in age?. *Journal of occupational and organizational psychology*, 69(1), 57-81.

Damisa, M. A., & Yohanna, M. (2007). Role of rural women in farm management decision making process: Ordered probit analysis. *World Journal of Agricultural Sciences*, 3(4), 543-546.

Danish, R., & Usman, A. (2010). Impact of Reward and Recognition on Job Satisfaction and Motivation: An Empirical Study from Pakistan. *International Journal of Business and Management*, 5(2), 167-195.

García-Bernal, J., Gargallo-Castel, A., Marzo-Navarro, M., & Rivera-Torres, P. (2005). Job satisfaction: empirical evidence of gender differences. *Women in management review*.

Ghazzawi, I. (2011). Does age matter in job satisfaction? The case of US information technology professionals. *Journal of Organizational Culture, Communications and Conflict*, 15(1), 25.

Mishra, P. K. (2013). Job satisfaction. *IOSR journal of humanities and social science*, 14(5), 45-54.

Ordine, P., Rose, G., & Fasano, M. (2021). It's Time to Degree! The Impact of Reducing Barriers to Entry into Professions on Late Graduation: The Case of Pharmacists. *Journal of Human Capital*, 15(2), 237-268.

Sadun, R. (2008), Does planning regulation protect independent retailers? CEP Working Paper 888.

Schaumans, C. & Verboven, F. (2008), 'Entry and regulation – Evidence from health care professions', RAND Journal of Economics. Forthcoming.

Schivardi, F., Viviano, E. (2010). Entry Barriers in Retail Trade. *Economic Journal*, 121 (551), pp. 145-170.

Shahzad, K., Mumtaz, H., Hayat, K., & Khan, M. A. (2010). Faculty Workload, Compensation Management and Academic Quality in Higher Education of Pakistan: Mediating Role of Job Satisfaction. *European Journal of Economics, Finance & Administrative Sciences* (27), 111-119.

Van, N. S., Sluiter, J., Verbeek, J., & Frings-Dresen, M. (2003). Reliability and validity of instruments measuring job satisfaction – a systematic review. *Occupational Medicine*, 53, 191-200.

# **CHAPTER 3**

## **Gender Quotas and public expenditure: the effect on primary school students**

### **Abstract**

We analyse whether a shift in public expenditure, due to the gender quotas, resulted in an increase in pupils' score. This study uses three different Italian datasets from 2008 to 2020, we find that despite the change in public expenditure, there is no effect on the performance of primary school's students.

### 3.1 Introduction

A different number of researches is focused on the increasing skills of students. In particular, this project is focused on the students of the primary school, who represent the future human capital. Moreover, the human capital plays a crucial role in economic growth, and is often linked to the investments carried on in education. The goal of this study is to show whether the change in public expenditure, due to a change in gender quotas rules, can affect the performance of primary school's students.

Previous researches on the gender quotas analysed how female major or chancellors can affect the public expenditure. These researchers, as for example Everitt (2002), found that an increase number of women in town council leads to a rise in investment in education. Starting from this literature, we analyse whether in the city in which the number of women in the council is greater, the performance of the pupils is higher. To be more specific, the main idea is to take into account the results of the “invalsi” test, and investigate whether the rise of the investment in education had an effect on it. In fact, as pointed out in some papers listed in the next paragraph, an increased percentage of women in city council lead to a rise of public expenditure in education, which in turns means better school resources, that could provide an upgraded educational experience for the pupils, who can increase their performance. To sum up, higher percentage of women in council provide more money for the primary school, who can finance a better-quality educational system, which promotes better pupils' scores. We expect to find a correlation, despite some previous researchers, e.g. Coleman et al. (1966), showed that public investment cannot effect pupils' performance. The data analysed in this study is composed from three different datasets, all of them obtained from some government's website. The first one<sup>4</sup>, contains information on the city council composition, such as sex, age, previous job and degree of the major and chancellors. The second dataset<sup>5</sup> is about public expenditure and how much money are divided for every type of investment. The last one<sup>6</sup> contains information on the average score of the “invalsi” test per each city. These scores are divided by subject: Italian grammar and mathematics. This division is important because, the

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<sup>4</sup> <https://dait.interno.gov.it/>

<sup>5</sup> <https://finanzalocale.interno.gov.it/>

<sup>6</sup> <https://invalsi-serviziostatistico.cineca.it/#comunali>

effect of the increase in education investment can be correlated with some specific subject, such as mathematics (Steele et al., 2007). The city included in the analysis are 7.419.

The paper is divided as follow. After this introduction, in the next session, we discuss the literature on “gender quotas” and “pupils’ performance”. Below, in the third paragraph there is the main body of this study; this part is divided in three sub-paragraph: the presentation of the information contained in the dataset, the Regression Discontinuity Design model, and the results obtained using the STATA software and highlighted using tables. Finally, we conclude.

## **3.2 Literature review**

### **3.2.1 Gender Quotas**

Nowadays, all around the world, the difference between men and women is slowly reducing, thanks to the fact that the level of education and labour force of women is increasing. Moreover, the political participation of women represent a very important part in levelling the gap between men and women. Of course, what mentioned above, does not means that the gender gaps is completely eradicated. In the poorer countries, even if the gap is smaller than previously, there is still a lot of work to do. Fortunately, in the richest countries, the gap is getting closer to an end, day by day, but women remain underrepresented when taking into account the leadership positions, even more for what concern politics. Is not so hard to believe that there is a problem in this field. In fact, as pointed out by Ramirez (1997), it is useful to remind that women reached the right to vote in 96% of the world only in 1994.

This limited presence of women in leadership positions indicates the needed for a response by the public policy. Furthermore, considering the fact that women desire to be leaders as much as men. Moreover, according to Gerkovich (2004), there is no difference for what concern this desire between women who have children and women who do not. As for the desire, even for the expertise is the same: Beaman et al. (2011) thanks to a survey conducted in India on elected female village leaders, interviewed after two year of government, show that these women feel as capable as their male colleagues.

Focusing on the idea behind this project, several empirical evidence pointed out that women and men have different preference about policy. For example, in one of these researches, Everitt (2002) highlighted that women attribute a greater urgency to the issue involving social welfare than men. Moreover, Hessami and Lopes (2020) pointed out how the increased share of women in city council lead to a change in policy choices, as more child care, even if this change could not be observable in the composition of public expenditure.

Nevertheless, having different priorities does not mean that the goal will be reached. In fact, in a paper that is really close to the idea of this work, Bagues and Campa (2021) analyze the Spanish situation of gender quotas. They find out that quotas raise the share of women but they do not observe any change in the composition of public finances. Despite this result, the focus of this project is to analyze the same data, but in Italy, to reach another conclusion: using the growth number of women in the city council as an instrumental variable for the increasing of investment in primary school, then in turn, could have an improvement of students skill as a consequence.

### **3.2.2 Primary School Mark**

When an analysis on the human capital is carried on, usually the focus is on workers, or universities students, who are in the earlier step. Although, over the years a lot of researchers analysed primary school and children behaviour, but most of these studies are conducted from a sociological point of view. Differently, the idea in this chapter is to try to analyse this very young students, since if they can perform better it is possible to have better student even in their future path, and in turn, better human capital in future. As pointed out before, most of the studies on this topic are conducted from a sociological point of view, nevertheless some researchers tried to analyse this topic from a point of view that is closer to the one analysed in this work. For example, Edmonds (1979) highlighted how despite the same background for distinct children, various school were less effective than others. This demonstrate how primary school students can be affected by the level of the school itself. Going back even further, Carroll (1963) proposed a model for this kind of analysis. This model were based on five index: aptitude, perseverance, ability to understand instruction, opportunity to learn and quality of instruction. Meanwhile the first three are something that is based on the child characteristics, the last two are easier to control from an external point of view. In fact, the quality of instruction is something that does not depend on the child himself, but on the school

and even more on the investment on education. Analysing some studies closer to the idea of this project, it was found that this topic is very disputed because different studies lead to different conclusions: meanwhile some researchers pointed out that there isn't a relation between the public expenditure and the pupils' performance, others highlighted the contrary. In the former group of studies, Coleman et al. (1966), pointed out that public expenditure has no effect on the performance of primary school students. Moreover, other researchers found the same results. This leads to think that performance could be affected by something else. In fact, Dee (2005), as other different studies, highlighted how family and background are the most important factors that influence students' performance. Another important factor is the type of educational organization. Creswell et al. (2006) found that, meanwhile in the developed countries with comprehensive schooling the outcome is the most equal, in countries with more selection the outcomes tend to be unequal. Although what described so far, some researchers found a link between public expenditure and pupils' performance. For example, according to Steele et al. (2007) this impact exists, but it involves the score of subjects as mathematics, meanwhile English mark is unaffected. Moreover, Gibbons, McNally and Viarengo (2018) founded that school resources have an important impact on the pupils' results in the national test (the English version of the "Invalsi test" used in this topic). The idea behind this chapter starts from the aim to add another point of view in this topic, improving what founded by other researchers until now, analysing whether the shift in the institutional asset had an effect on the students level.

### **3.3 Methodology**

#### **3.3.1 Data**

This study examines the relationship between the increase in public expenditure in primary school and the mark obtained by students during the "invalsi" test. This study uses a quasi-experimental method: the Regression Discontinuity Design. Moreover, even if the model is just one, it is used with different variables, since this project is divided into three steps. Since there are three parts in this work, for each step there is a different dataset. The first one is about town council and its composition. This dataset contains a large amount of information on major and all the person enrolled in the council, all over Italy, interviewed between 2008

and 2020. This information are public and available on the government webpage<sup>7</sup>. The most important information in this data is the number of women in the city council, thanks to which was possible to compute the percentage of them in every town in Italy. The second one is about the public expenditure for each city and, as it was for the first one, it can be found on another government webpage<sup>8</sup>. For each city, there are different value for every sector or subject in which the city council decides to use the money, but for this work, only the expenditure in primary school was taken, since is the most important for the project, and just someone else as a “control group”. The third, and last one, dataset is about the “invalsi” mark. This is the smaller dataset, because there is just information about the mean of the mark in different subject, as Italian grammar and mathematics, and for different ages: second year of primary school, fifth (and last) year of primary school, and older students, for each city. Unfortunately, there are not information about every single students, that could be very helpful for the research.

To go on with the project, these three dataset are merged in a single one, using as a key variable the city code and the year. Doing so, a large dataset is obtained, with 96.447 observations which corresponds to 7.419 city, observed for 13 years per each. There are more than 80 variables, spit in three groups, about:

- City council information (major’s sex, number of person in the council, type of degree of the major, sex information for each person, etc...)
- Public expenditure information (on different subject as a primary school, sport, universities, etc...)
- “Invalsi” test mark (mean value for each city)

For this work the more relevant variables are the number of inhabitants and the election year, which are used to distinguish the pre-treatment period and the post-treatment one, dividing the treated city from the control group. Moreover, the variable about the “invalsi” test mark is the most important variable and is the one that is used as dependent variable at the end of this work.

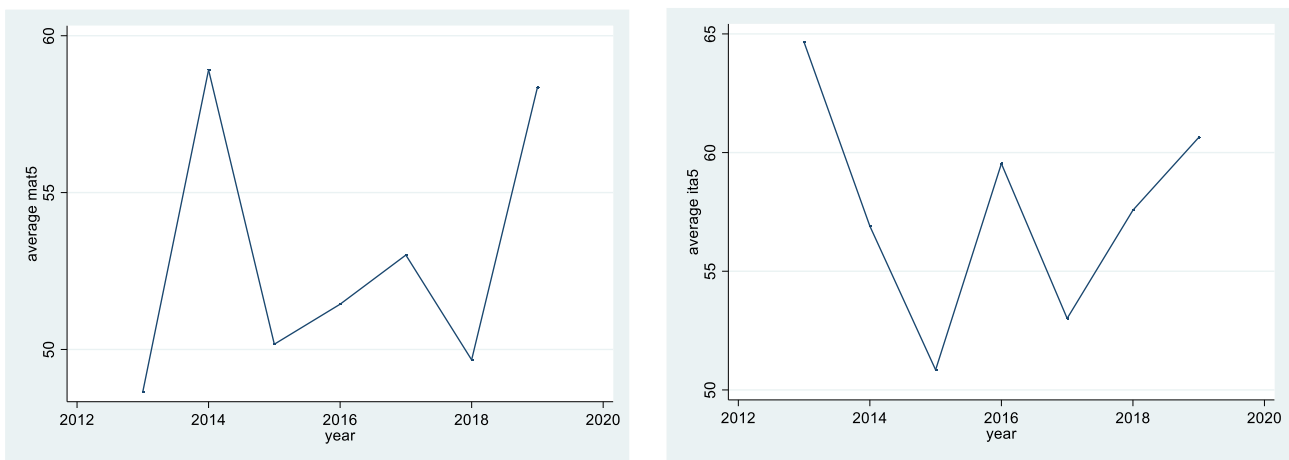
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<sup>7</sup> <https://dait.interno.gov.it/>

<sup>8</sup> <https://finanzalocale.interno.gov.it/>

For what concern the descriptive statistics, we point out some information on the main variables. In the treated municipalities the average share of women before treatment is 19.34%, that increase to 42.03% after the treatment. In the untreated city, even if there is an increase, is not so marked, in fact the share goes from 22.15% before treatment, to 30.92% after it. Moreover, in Table 3.1, is highlighted the average score of the “invalsi” test, from 2012 to 2020. The left one is about mathematics and the right one about Italian grammar.

Table 3.1 - "Invalsi" test's average score



### 3.3.2 Model: Regression Discontinuity Design

The model chosen is the Regression Discontinuity Design. The analysis with this model goes through the analysis of the RDD graph, since is an easy model to read.

The Regression Discontinuity Design is an almost experimental estimation technique, used in statistics, econometrics, political science, epidemiology and other fields, to evaluate the effectiveness of a treatment going to compare the phases before and after the test, isolating random effects by assigning a threshold value, above and below a certain level of the intervention. Going subsequently to estimate the observations near the threshold it is possible to estimate the effect of the treatment.

The RDD charts that will be illustrated from here have been built with the use of the software "STATA", using different variables of interest: on the ordinate axis will be used different variables according to the kind of analysis conducted, while on the abscissa will be used the same variable: "population". Finally, to complete the chart it is important to choose the point of "cutoff", which in the present case corresponds to 5000 inhabitants, which represents the minimum level of population for which the law about gender quotas enters into force.

### 3.3.3 Results

Using the statistic software STATA, it was possible to point out the results of the RDD model described previously. The analysis started from the police evaluation. The model is shaped to understand whether the law about gender quotas had a real impact on the composition of the town council. For a better comprehension, two table are highlighted below. Both use the same variable, as described in the previous paragraph, but the former (Table 3.2) is carried out for the town where the last election was before the treatment, the latter (Table 3.3) is about those city where the election was after the treatment.

Table 3.2 - Percentage of women in town council – before treatment

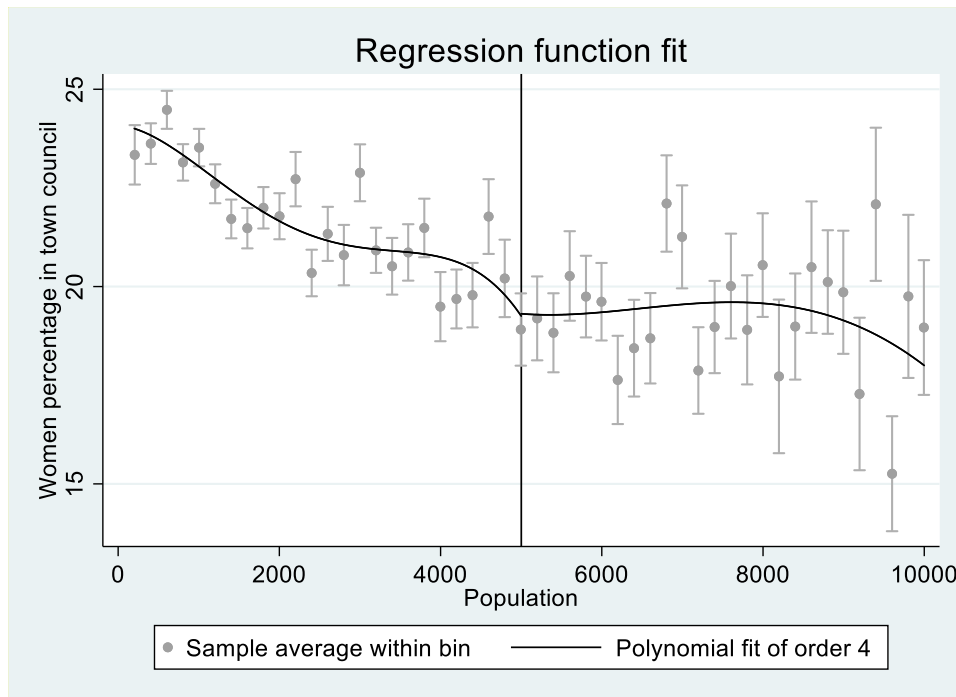


Table 3.3 - Percentage of women in town council - after treatment



As is pointed out from the Table above, the difference between the two period (pre-treatment and post-treatment) is well-defined. In fact, before the law was enacted, the relationship between the city-size and the number of women who attends the council was reverse: there was more women in the small city than in the bigger one. Meanwhile, after the treatment there is a really evident jump in the bandwidth of the cutoff. In the city with more than 5000 inhabitants, the percentage of women is higher than in the city with less inhabitants. These Tables showed, without doubt, that the law had the desired effect.

Having the police evaluation highlighted the desired result, we can move on to the second point of the analysis. In fact, now that the tables highlighted the increase of percentage of women in the city council, it is important to analyse if it is true that women tend to invest more in some specific sector. As pointed out in the literature review, different works show that an higher percentage of women in the city council brings to a change in the public expenditure, in fact, women are more focused in sector as primary school and for this reason they have a tendency to spend more money in this area. For this reason, it is expected to find an increase in the public expenditure in primary schools. To conduct this analysis, as before, the RDD model is used, with the same variable on the x-axis, meanwhile in the y-axis the variable used will be the public expenditure for the primary school. Since the focus point is

the difference in the city with a little bit more than 5000 inhabitants and those with a little bit less than 5000, become very important to choose wisely the level of bandwidth to use for the RDD graph. For this reason, the STATA command “rdbwselect” is used. In this way STATA will select the correct level of bandwidth for the regression. In the Table 3.4, showed below, it is possible to see the result of the command.

*Table 3.4 - output of the “rdbwselect” command in STATA*

Bandwidth estimators for sharp RD local polynomial regression.

Cutoff c = 5001	Left of c	Right of c	Number of obs =	16363
Number of obs	12514	3849	Kernel =	Triangular
Min of popolaz	1200.000	5200.000	VCE method =	NN
Max of popolaz	5000.000	9800.000		
Order est. (p)	1	1		
Order bias (q)	2	2		

Outcome: s\_istruzprescolastica. Running variable: popolaz.

Method	BW est. (h)		BW bias (b)	
	Left of c	Right of c	Left of c	Right of c
mserd	694.516	694.516	1412.610	1412.610

The Table 3.4 suggests a bandwidth level of 694.516, that means to analyse the RDD graph using the population between 4305 (5000 – 695) and 5695 (5000 + 695). For convenience, the next graphs will be carried out using a level of population from 4000 to 6000, that is very closer to the level suggested by the previous analysis carried out. As it was done for the percentage of women in the city council, for a better comprehension, two different graphs will be carried out: the former (Table 3.5) is carried out for the town where the last election was before the treatment, the latter (Table 3.6) is about those city where the election was after the treatment.

Table 3.5 - Public expenditure in primary school before treatment

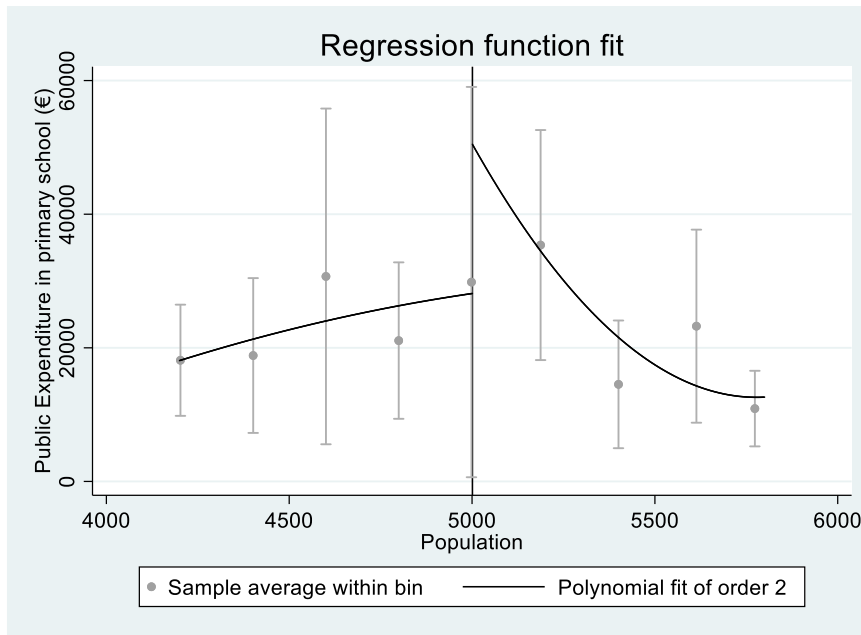
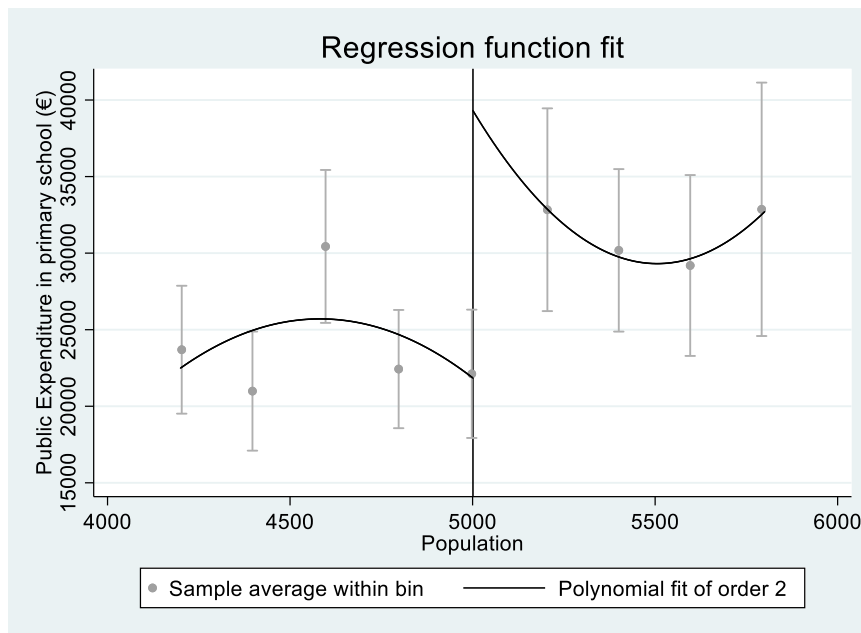


Table 3.6 - Public expenditure in primary school after treatment



Looking the Table 3.5 and 3.6, is possible to notice a difference near the cutoff point. These tables seems to show what was expected: a change in the public expenditure in that city where the percentage of women was increased by the law described before. In fact, in the former

graph, in the bigger cities, the trend is descending, meanwhile in the latter graph, the curve be likely to grow up. To be sure that the effect founded is due to the change in the percentage of women in the cities councils, some others RDD graphs, keeping the basis untouched, will be carried out, in sector in which the previous works on public expenditure linked to the composition of the town council did not show a change. In the example the sector analysed is the “youth policies and sport”. As before two graphs will be carried out.

Table 3.7 - Public Expenditure in youth police and sport before treatment

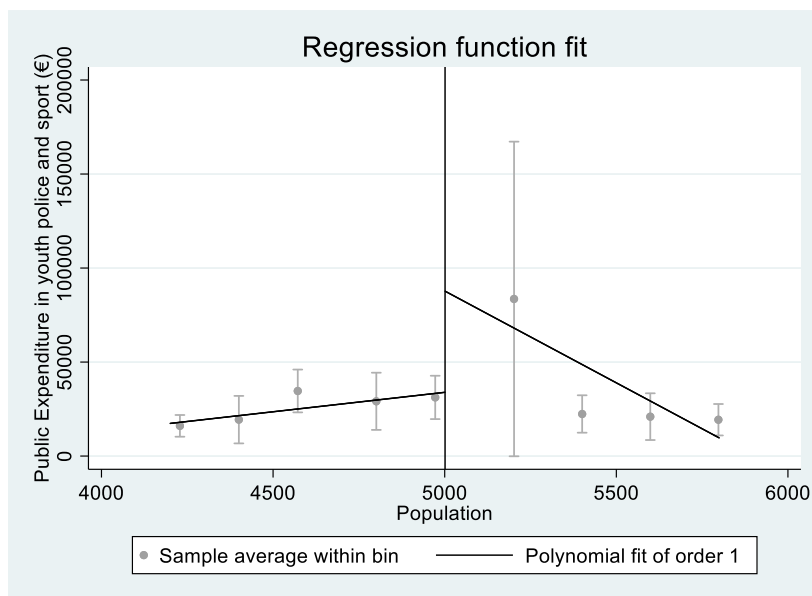
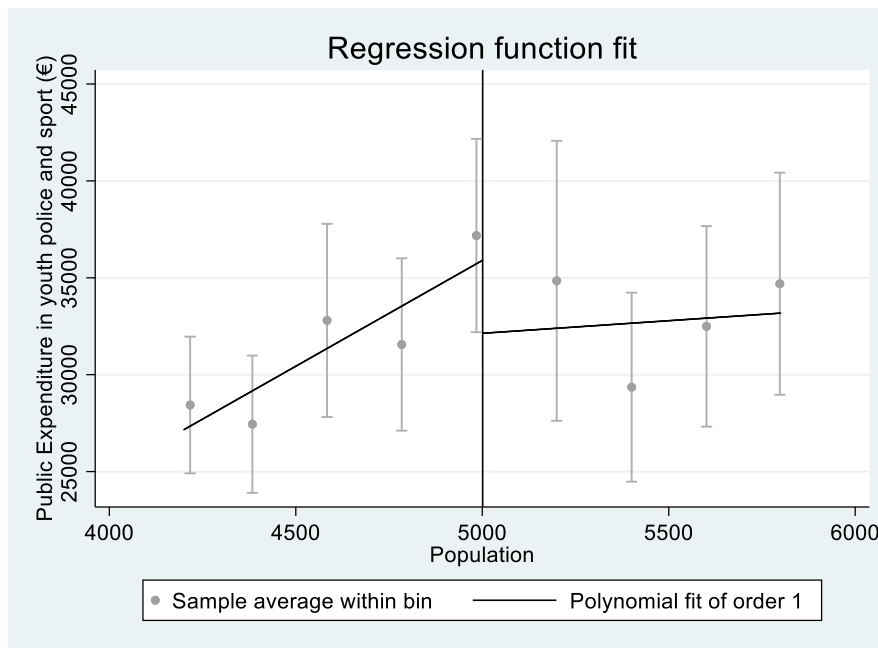


Table 3.8 - Public expenditure in youth police and sport after treatment



Looking the last tables, no difference is highlighted. In both cases, there is no difference in the bandwidth of 5000 inhabitants. What showed before seems to be another clue that demonstrate what was expected: the change in women percentage in the towns councils led to a change in the public expenditure, and more precisely, to an increase in the level of money used to support the primary school.

As described before, this project is divided into three steps: police evaluation, which has proved a valuable impact, demonstrating that gender quotas had an effect on the public expenditure, and the last step is to understand if this increase in the investment in educational system had an impact on the pupils' performance. To do so, some others RDD are carried out, using as variable for the y-axis the score that students obtained during the "invalsi" test, meanwhile the x-axis presents always the same variable: the population.

Is important to point out what is captured by the "invalsi" score<sup>9</sup>. For the Italian grammar, the capacity of comprehension of the text, and its logic connection, is measured. The mathematics test verify the most important knowledge, such as capacity to solve problems and argue about the solutions. This section is divided into four fields: statistics, algebra, geometry and

<sup>9</sup> <https://www.invalsiopen.it/prove/cosa-misurano-le-prove/>

function. What described so far it is helpful to understand that this test is not about memorisation of information, but on the reasoning skills. For what concern the score itself, the dataset contains two kind of score: the average percentage score and the average WLE score, both adjusted for cheating. The former is simply the average of the percentage of right answer. The latter is computed according to the ability estimation of Rasch. Due to its simplicity the average percentage score is chosen to carried out the next tests.

As it was done for the previous RDD, in this section as well, the regression is carried out twice per each subject. The former Table represents the score in those city were the last election was enacted before the change in the gender quotas rules. Meanwhile, the latter shows the same variables, but in the cities where the election was conducted after the treatment. For all the Tables below, the students taken into account are those at their last year of primary school.

The Table 3.9 and 3.10 below, shows the results for what concern Italian grammar.

Table 3.9 - Score of "invalsi" test - italian grammar – before treatment

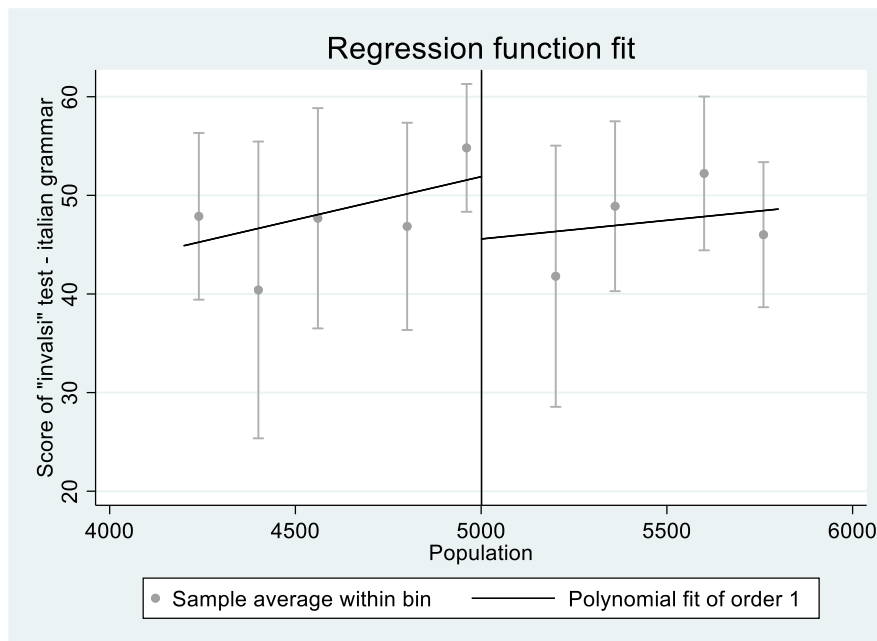
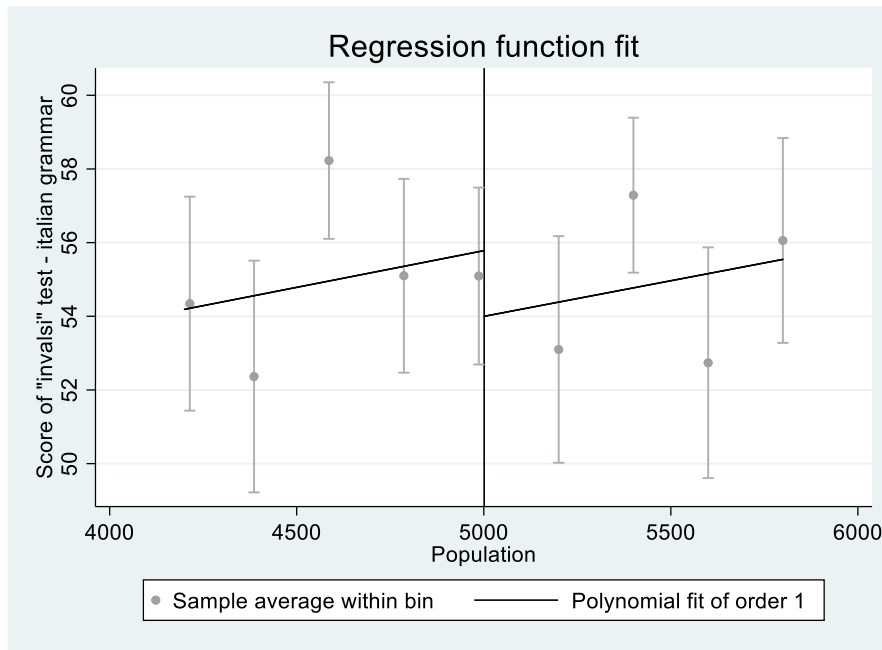


Table 3.10 - Score of "invalsi" test – italian grammar – after treatment



Unfortunately, these last tests carried out, seem to demonstrate that no effect is pointed out for what concern Italian grammar. This seems a confirmation of what already pointed out by Steele et al. (2007). They highlight that mathematics is effected by the rise of investment in education, meanwhile English grammar isn't effected. For this reason is important to carried out another test for mathematics. Table 3.11 and 3.12 below, show the same analysis conducted in Table 3.9 and 3.10, using mathematics instead of Italian grammar.

Table 3.11 - Score of "invalsi" test – mathematics – before treatment

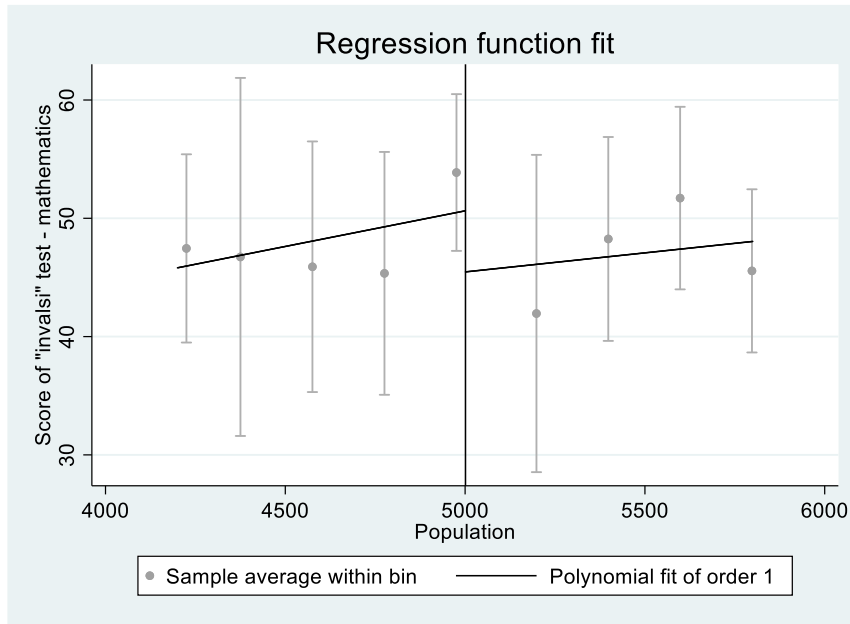
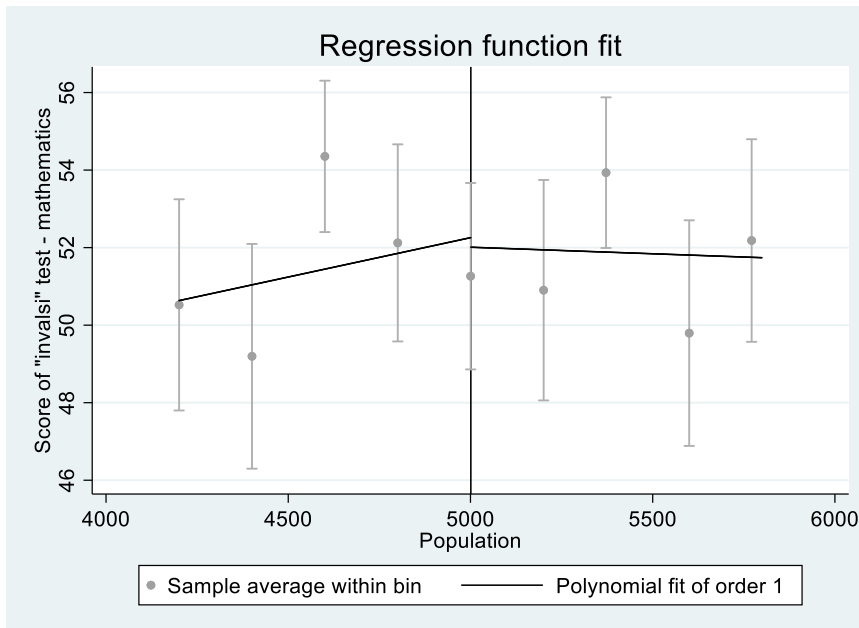


Table 3.12 - Score of "invalsi" test – mathematics – after treatment



For a deeper analysis, a difference-in-differences regression is carried out. The focus of these regressions is the same of the RDD. The dependent variables is the score in Italian grammar and mathematics, meanwhile the diff-in-diff variable is the correlation between the treated

group (city with more than 5000 inhabitants) and the treatment period (election after the implementation of the gender quotas).

Table 3.13 - Difference-in-Differences for italian grammar

Italian grammar	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
fem_percent	.077	.023	3.31	.002	.03	.123	***
popolazione_censita	.002	0	8.71	0	.001	.002	***
codice_provincia	.039	.012	3.34	.002	.016	.063	***
elect_year	1.511	.125	12.09	0	1.26	1.762	***
count	-1.577	.16	-9.85	0	-1.899	-1.255	***
tempo#pop5k	.	.	.	.	.	.	.
0 # 1	-.351	2.045	-0.17	.864	-4.461	3.758	
1 # 0	-.344	1.572	-0.22	.828	-3.504	2.815	
1 # 1	-3.561	1.775	-2.01	.05	-7.128	.006	*
Constant	-2977.221	252.278	-11.80	0	-3484.193	-2470.249	***
Mean dependent var		55.910	SD dependent var			19.979	
R-squared		0.069	Number of obs			12443	
F-test		46.716	Prob > F			0.000	
Akaike crit. (AIC)		108964.366	Bayesian crit. (BIC)			109031.226	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Table 3.14 - Difference-in-Differences for mathematics

Mathematics	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
fem_percent	.049	.023	2.14	.037	.003	.096	**
popolazione_censita	.001	0	6.14	0	.001	.002	***
codice_provincia	.013	.01	1.32	.194	-.007	.033	
elect_year	1.566	.126	12.44	0	1.313	1.819	***
count	-.809	.155	-5.21	0	-1.12	-.497	***
tempo#pop5k	.	.	.	.	.	.	.
0 # 1	-.975	2.12	-0.46	.648	-5.235	3.286	
1 # 0	-2.771	1.749	-1.58	.12	-6.285	.743	
1 # 1	-5.319	1.871	-2.84	.007	-9.078	-1.559	***
Constant	-3095.48	253.946	-12.19	0	-3605.803	-2585.157	***
Mean dependent var		52.813	SD dependent var			18.720	
R-squared		0.044	Number of obs			12443	
F-test		41.970	Prob > F			0.000	
Akaike crit. (AIC)		107675.268	Bayesian crit. (BIC)			107742.128	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

In these regressions the results are not those expected as well. In fact, the Tables do not shows differences between the period before and after the treatment. Although these results are different from what we expected, they are a confirmation of what other researchers, such as Coleman et al. (1966), and all the others after them, highlighted. It can probably be due to the

fact that in this very young age is difficult to improve enough to have a significant shift in the average score. This because, meanwhile in universities' level the amount of skill required and learned is high enough to see some differences between students, at the pupils level is hard to distinguish who perform better from those who are less likely to improve. Moreover, as pointed out in the literature review, the pupils' score is more likely to be affected by their own background and families, than by other factors.

### **3.4 Conclusion**

The main idea behind this project was to evaluate if the students of primary school, after the increase in public expenditure, obtained a better mark, as a proof of their improvement.

As it was pointed out in the third paragraph of this project, there is a difference in public expenditure between city with more than 5000 inhabitants where the last election was after 2012 and other city with the same number of inhabitants but with the last election before 2012. This difference is due to the increase of the number of women in the city council. To be more specific, in the town that had an election after the law on gender quotas the public expenditure for primary school is higher than town with less than 5000 inhabitants, meanwhile for the bigger town without recent election there is no difference with smaller city. According to this result it is possible to say that the first goal of the project is reached. As it was for the first one, the second goal is reached as well. In fact, keeping the same kind of analysis, in the city in which there was an increase of the number of women in the council it was found a rise in the public expenditure for what concern the primary school. This is showed in the graph of the previous paragraph. According to these results it is possible to say that the reform, has a consequences in improved the investment in primary school. These results are the second step of a bigger project, which started finding that the percentage of women in the town council growth after the reform analysed in this work. For this reason, the conclusions of these two parts brings to the fact that a single reform, designed to increase the gender quotas, leads to a rise in money spent for primary school. Unfortunately, the last part of this project did not led to what was expected. In fact, despite the increase in investment, the mark of the "invalsi" test did not change in the city in which the percentage of women increased, remaining at the

same level of the city belonging to the control group. As a consequence of this analysis, there are some potential avenues for future research. In fact, a possible development for this study can be to analyse if using a better dataset for primary school students can lead to a different result. In fact, due to the Covid restriction occurred during this project, the dataset used are those that was possible to reach through the government webpages.

To sum up, it is important to analyse in a deeper way this topic, using other data with more detail about primary school students, in order to understand if the expenditure can bring an improvement of the human capital, even since the younger age.

### 3.5 References

- Bagues M. and Campa P., (2021), Can gender quotas in candidate lists empower women? Evidence from a regression discontinuity design, *Journal of Public Economics*, 194, 104315
- Beaman, L., Duflo, E., Pande, R., & Topalova, P. (2011, August). Political reservation and substantive representation: Evidence from Indian village councils. In *India policy forum* (Vol. 7, No. 1, pp. 159-201). National Council of Applied Economic Research.
- Carroll, J. (1963). A model of school learning. *Teachers college record*, 64(8), 723-723.
- Coleman, J. S. (1966). *Equality of Educational Opportunity: Summary Report*. Washington US Dept. of Health, Education, and Welfare, Office of Education; for Sale by the Superintendent of Documents, US Govt. Print. Off. University Microfilms.
- Creswell, J. W., Shope, R., Plano Clark, V. L., & Green, D. O. (2006). How interpretive qualitative research extends mixed methods research. *Research in the Schools*, 13(1), 1-11.
- Dee, T. S. (2005). Expense preference and student achievement in school districts. *Eastern Economic Journal*, 31(1), 23-44.
- Edmonds, R. (1979). Effective schools for the urban poor. *Educational leadership*, 37(1), 15-24.
- Gerkovich, P. R. (2004). Women and men in US corporate leadership: Same workplace, different realities?. *Catalyst*.
- Gibbons, S., McNally, S., & Viarengo, M. (2012). Does additional spending help urban schools? An evaluation using boundary discontinuities. *An Evaluation Using Boundary Discontinuities*.
- Hessami Z. and Lopes da Fonseca M., (2020), Female political representation and substantive effects on policies: A literature review, *European Journal of Political Economy*, 63, 101896

Ramirez, F. O., Soysal, Y., & Shanahan, S. (1997). The changing logic of political citizenship: Cross-national acquisition of women's suffrage rights, 1890 to 1990. *American sociological review*, 735-745.

Steele, F., Vignoles, A., & Jenkins, A. (2007). The effect of school resources on pupil attainment: a multilevel simultaneous equation modelling approach. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 170(3), 801-824.

## **Concluding Remarks**

This work analyse the effects of change in institutional asset in three different levels of human capital. A part of the last chapter, the others papers lead to a result that was as expected and in line with the works analysed in the literature review. Both demonstrate how it is possible to influence the human capital with a change in the labour market.

In the first chapter, the results show that a deregulation in the labor market have an indirect effect on students' time to degree. In fact, despite the change in the regulation of the pharmacies was enacted to improve the competitiveness, it leads to an unexpected positive result: giving an easier access to the labor market to the students, they are pushed to be faster in obtaining their degree, without compromising the mark of graduation. This means having younger workers, with more growth potential and so, a better human capital.

After their degree, the students become workers, who, as showed in the previous chapter, had an easier access to the labor market. In the second chapter, is analyzed the level of job satisfaction of those workers. The study pointed out that, not only the workers in the examined sector represent an improved human capital, but their satisfaction is higher as well.

In the third chapter, unfortunately, it was not possible to demonstrate that a change in investment can produce a development for the "future" human capital, represented by pupils. This result confirmed what some of the previous works already highlighted: there isn't a relation between public expenditure and the performance of primary school's students. Nevertheless, it was useful to remark how much important is the intention to close the gap between men and women.