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Evaluation of the Italian University reform policies. A case study*

by

Alessandra Decataldo[♦], Antonio Fasanella[▲]

Abstracts

Studies on university productivity show that little has changed though of the enforcement of DDMM 509/1999 and 270/2004: the long-standing ills that had afflicted the Italian university under the previous system still continue to affect it even after the adoption of the “3+2” reform.

These considerations on productivity of the university system are alarming especially in terms of the objectives that the DM 509/1999 intended to achieve and the expectations of what was invested. These expectations concern the control on productivity (more regular graduates) and an approach to academic and working life, maintaining high standards of quality training. It seems that has not worked out in the process of change from the old to the new university system. Italian university has answered to external pressures absorbing change content in pre-existing organizational structures and cultural background. We are conducting a research that allows for an in-depth examination of the phenomenon of poor productivity of the university system, and also sheds light on some of the factors that combine to determine this result. The Sapienza University of Rome was identified as an ideal context for this analysis, due to its dimensions and complexity, and because of its variety of scientific and educational areas of academic training.

The research involves conducting a secondary analysis of longitudinal data of administrative type for a description of the phenomena of late performance and student drop out.

It focuses on the batches of students enrolled in specific key moments before (from academic year 1991/1992 to 2000/2001) and after the reform (from academic year 2001/2002 to 2006/2007). Each of these batches (about 410,000 student enrolments) was monitored up to April 2008 (the official closing date of academic year 2006/2007).

The analysis take into account *ex novo* enrolments, excluding both the re-registrations and students who have already obtained more than one degree. Longitudinal analyses (the generational approach) allow us to individually monitor students in a single generation for a number of years, reduce the risks associated with aggregate data.

This data - required statistical office of Sapienza - were treated to obtain variables in line with the present research and then be reorganized into a diachronic database.

From a practical point of view, we analyzed how the DM 509/1999 was introduced and implemented within and by the university organization (analyzing a wide variety of phenomena such as dropping out, delayed and decreasing graduations). From a methodological point of view, we came to the creation of longitudinal multidimensional models of the students' careers, aiming at identifying the “mechanisms” through which from an initial state t_0 , a subsequent state t_1 is generated.

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1. The study of university careers

The analysis of the educational processes is characterized by the adoption of theoretic frameworks and investigation methodologies that are strongly influenced by the national specificities.

Within the international studies panorama it is possible to make a distinction between lines of investigation which are specifically oriented towards the analysis of educational processes lines of investigation which (even though they aren't strictly oriented in that sense) allow to obtain information about specific aspects of the university education. Another difference pertains to the employment of distinct procedures for the data gathering. The most common procedure makes use of primary sources (mostly questionnaires); the other one instead employs secondary sources, by directly or indirectly accessing to the administrative archives of higher education institutions.

Data contained in the university archives are gathered for administrative purpose and therefore they require a redefinition in order to be used for investigation. The organization of data and the way the information is transformed, can have consequences on the possibility to conduct an analysis according to certain criteria and with specific objectives. The data setting is different, for example, whether we decide to analyze the features of all the students enrolled in a specific college during an academic year (*contemporary analysis*), or the careers of the students within a specific college from the day of enrollment until a certain academic year (*cohort analysis*).

For example, in England longitudinal investigations (following subjects from their birth, *birth cohort studies*) are widely employed. Using longitudinal investigations it is possible to gather information on one's personal educational processes. Generally, these studies are conducted by integrating primary sources (by questionnaires) and secondary sources (by census and medical history, etc.). Among these the most relevant are the *British Cohort Study*, the *Longitudinal Study of Young People in England* and the *National Child Development Study*.

Longitudinal investigations on educational processes are commonly used in the United States, which is a country with a strong tradition about theoretical research on phenomena such as *persistence* and *dropping out*. In particular, the *Educational Longitudinal Study* investigates an educational path of students, the transition to post-graduate schools, the progresses within these institutions and the placement into the job market. In this study, questionnaires are repeatedly given to the individuals belonging to the analyzed cohort, as well as their families, teachers, deans and administrative personnel; utilized administrative data are also expressed in terms of performance, ranking, etc. The *Beginning Postsecondary Students Longitudinal Study* and the *Baccalaureate & Beyond Longitudinal Study* are mostly focused on persistence, progress and acquired qualifications, on the analysis of the relationship between formation and placement into the job market and on the effects of college education on individual life path.

In Canada there is a national database (the so-called *University Student Information System*) containing information on student participation to educational programs; the collected data are gathered through individual administrative records.

Sweden has a research program (called *Evaluation Through Follow Up*) that counts two distinct lines of investigation: 1) survey and 2) registry data. These data allow for an individual study of a student educational history from the first to the sixth mark of education and to the placement into the job market. The distinctive feature of the Swedish data gathering system is the assignment to each individual of an ID number used in every database; this system compares data from different sources.

In France, there is one longitudinal study (called *Panels d'Élèves*) which starts during the sixth mark of education and monitors students on annual basis. The information is gathered by deans.

In Spain, the national statistic institute collects information on the enrolled and graduated students through cross-sectional analysis.

Germany, instead, doesn't use any longitudinal study offering a solid basis for the investigation of the educational history of adolescents and young adults throughout numerous stages of their educational career.

In Italy, three main agencies (the Department of Education University and Scientific Research through its annual publication *L'università in cifre*, the Evaluation National Committee of University System, through its annual report called *Rapporto sullo Stato del Sistema Universitario*, and the AlmaLaurea Consortium, through its annual *Profilo dei laureate* publication) gather, analyze and publish data on the university system with the following goals: 1) estimating the productivity level; 2) understanding the effects of reforms through time; 3) evaluating the validity of the educational programs within each department; 4) analyzing the processes of transformation; 5) recording strengths and weaknesses.

In pursuing these objectives, a strong remark is given to three aspects: a) the number of graduates; b) the number of late graduates (*fuori corso*); c) the number of drop-outs. In the majority of cases, these are transversal studies for contemporaries repeated in time (conducted on always different aggregates and by ignoring their university careers).

These agencies work on renovated universes namely formed by students enrolled in the Italian university system every specific academic year. This strategy ignores finished or unfinished university careers of each aggregate components; this strategy is based on using transversal studies for contemporaries repeated over the time.

The best strategy to analyze change is represented by using longitudinal *panel* studies, which monitor the same subjects over the time repeatedly and imply a pseudo-experimental logic of investigation.

Among longitudinal extraction strategies it is possible to make a distinction between those who focus on the aggregates and those who focus on individual data (Ruspini, 2004). The first strategies might be at risk of giving just a partial lecture of the dispersion phenomenon among the university students. The second strategies are able to offer quite more accurate results¹.

The cohort study represents a specific subtype of longitudinal studies; the cohort is an aggregate of individuals who experienced the same life event within the same time span.

In this paper we introduce a new *longitudinal multidimensional model based on individual data*.

2. Research on enrollments at Sapienza University of Rome

In the last ten years the Italian university system has been characterized by radical reforms (DDMM 509/99, 270/04 and 240/10). According with the so-called *Sorbona Agreement* (1998) These reforms have determined a transition from a university education based on only and one phase (5/6 year courses of university degree, in Italy called *laurea a ciclo unico*), to a new vision that introduce a stratification of education levels (in Italy called *laurea triennale* and *laurea specialistica/magistrale*).

The research group asked SATIS (Services, applications and computer technologies at Sapienza University of Rome) to provide them with the information on university careers of all the enrolled students in each department of Sapienza (a entire description of this research is presented in a paper of Fasanella, Benvenuto and Salerni, 2010):

1. during ten moments within the pre-reform years (from 1991/1992 to 2000/01);
2. during six moments within the post-reform years (from 2001/2002 to 2006/2007).

Each one of these cohorts was monitored until the end of the academic year 2007/2008 (therefore the first cohort was monitored for sixteen years, the second cohort for fifteen years, etc.)

¹ A pioneering longitudinal study on dropping out at Sapienza was conducted by Ali (1998). Investigations with a generational approach on the new didactic structure have been brought on by Fasanella and Tanucci (2006) within 5 departments at Sapienza; at a national level by Fasanella and Decataldo about Sociological Sciences courses of study (Fasanella, 2007; Decataldo, 2007; Decataldo and Ricotta, 2007; Decataldo and Truglia, 2008); at local level at Sapienza University (Fasanella, Benvenuto and Salerni, 2010; Decataldo, 2010).

The structure of this research presents some complex elements. In fact, on one hand it is possible to refer to it as a *panel* research, on the other hand it has a strong resemblance with a classic pseudo-experimental research design (for example Star and Huges, 1950). This is the research design based on pre-tests and post-tests conducted on separate samples/populations (Campbell and Stanley, 1966; tr. it. 2004, p. 137 and ss.), or even called “simulated design before and after” (Selltiz, Jahoda, Deutsch and Cook, 1959, p. 116 and ss).

The first of the two examined populations is represented by students enrolled at Sapienza University of Rome until the year before the application of the reform of University Order (the DM 509/99, that could be defined as the experimental variable), while the second population is represented by students enrolled at the same University since the “3+2” system was first introduced (2001/2002). We consider the students enrolled at Old order as the *pretest* population, while the students enrolled at New order as the *posttest* population. The assumption behind our research design is based on a longitudinal perspective that offers the possibility to assume the introduction of the Reform as the cause of possible differences of the university career outcomes between *pretest* population and *posttest* population.

This strategy allows us to evaluate the university reform about its main goal: to exert more control on phenomena of dispersion, of students exceeding the legal duration of the course of study (a particular phenomenon in Italy called *fuoricorsismo*), of low numbers of graduates.

About this Campbell and Cook suggested:

cohorts are useful for experimental purposes because (1) some cohorts receive a particular treatment while preceding or following cohorts that do not, (2) it is often reasonable to assume that a cohort differs in only minor ways from its contiguous cohorts, and (3) it is often possible to use archival records for comparing cohorts who have received a treatment with cohorts who were in the same institutions before the treatment began or after it was discontinued (Campbell and Cook, 1979, p. 127).

This kind of quasi-experimental design implies a total control on external validity factors and not a total control on all internal validity factors. As we know the internal validity is the minimum requirement to interpret the experiment. The internal validity allows the control on the existence of a connection between the experimental treatment and one empirically observed effect.

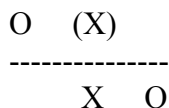
It is possible to consider 8 different internal validity factors (history, maturation, testing, instrumentation, statistical regression, selection, experimental mortality, selection-maturation interaction). In the present research this invalidity factors can be considered as controlled because:

1. all members of each cohorts involvements (who have been observed for their entire career even in the event of mortality such as dropping out);
2. the information source is an administrative archive (differently to information by survey research, this archive is not liable to content changes in its contents due to external or internal events),
3. the experimental variable effect has been controlled several times (e.g. for each cohort) during the overall research (equivalent considerations about control of the internal validity factors in case of research designs making use of cohorts are in Campbell and Cook, 1979, pp. 128-133).

In particular referring to the history factor (the most dangerous for this type of design) macro (at the national university system) and micro (at Sapienza University) historical factors did not happen in the years following the introduction of the university reform (2001-2008). These macro and micro factors, in fact, could be confused with experimental variable effects. The observed changes concerning the organizational elements are themselves an effect of the experimental variable (e.g. they were reformed by DDMM 509/99 and 270/04).

The external validity, however, concerns the possibility to generalize experimental results. There are four factors that can endanger the external validity (reactive or interactive testing, interactive effect between distortions, linked to reactive effects of experimental conditions, interference). The external validity factors are all controlled in this kind of quasi-experimental design.

Following Campbell and Stanley (1966, tr. it. 2004) and Cook and Campbell (1979), the survey design can be represented graphically as follows:



In the diagram above the lines represent the two populations which are supposed as equivalent for the entrance into the university system characteristics (tab. 3). On the first line O (that means the career observation of Old order cohorts) precedes X - in fact, X in brackets is a presentation of the experimental variable (the introduction of university reform) that is irrelevant to the research design. On the second line O (that means the career observation of New order cohorts) succeeds to X (the introduction of university reform). The dotted line represents the *naturalness* of groups (populations), namely they are not based on randomization procedures².

The diagram above presented is a simplification because of the information about the two populations were not collected one time before and after the introduction of the university reform. In fact, these information were surveyed in several moments of enrolled university careers registered in different academic years under the old (pretest) and the new (posttest) order.

The two populations are constructed according to a panel logic. First one, this logic provides a stratification in cohorts of the two populations based on the academic enrollment year of students (therefore the two O of the presented diagram represent a stratification of the observations). Second one, this logic provides a collection of information about every student for each cohort of the two populations in relation to *n* moments (*n* is the number of semesters between the enrollment date and the time when data were collected from the University main archive – in April 2008).

The information is the same for the first population (pretest) and for the second population (posttest). We assume that the New order (introduced by the DM 509/99) could be defined as the experimental variable, whose “effects” on productivity/dispersion phenomena can be pointed out during the posttest phase. These effects are evaluated according to a pseudo-experimental logic, by analyzing the shifts between the pretest results (first population) and the posttest results (second population).

The assumption behind this research design is that the longitudinal perspective is able to provide an *accurate frame* of curricula (that are monitored at intervals of six months) and to reconstruct the potentially relevant events to the outcomes of their university career.

The database is a “cases-variables matrix”, where the lines indicate the cases represented by the students, and the columns indicate the variables related to each individual’s personal information.

Each cohort is represented by *purely enrolled (immatricolati puri)*: any information on students that begin their careers with some credits on their account (a previous university experience or another higher education degree) has been eliminated.

During the Old order (from 1991/1992 to 2000/2001) the students got the chance to enroll in 4, 5 or 6 year courses of study, all with the same legal value; now (in the New Order) the students can enroll in 3 year courses – *laurea triennale* – (after a 3 year degree it is possible to access an additional 2 year course of study – *laurea magistrale*) or 5/6 year courses – *laurea a ciclo unico* –, all of which having different legal value.

² Therefore this specific case is an adaptation of the Campbell and Stanley’s design because of the two groups were made equivalent not by a random process. Campbell and Stanley book dealt about this kind of adaptation widely.

The final matrix of data used for our analysis is represented by 409.914 students: 261.543 enrolled during the Old order and 148.371 enrolled during the New Order.
List 1 accounts for all the available data for each single student.

List 1 – Illustration of available variables

Personal information:

1. student id number
2. Gender
3. age (birth date)
4. residence
5. Incombe

Early education

6. high school degree
7. high school degree mark

Type of enrollment:

8. type of enrollment program (*Old order four, five and six year courses of study; New order three, five and six year courses of study*)
9. first enrollment year
10. course of study and department
11. initial administrative position within Sapienza system

Administrative position

12. student enrolled:
 - a1) in the same course of study of enrollment;
 - a2) in a course of study of the same or of another department;
 - a3) in a course of study of another university;
13. non enrolled student:
 - b1) with high school diploma;
 - b2) without high school diploma;
14. Graduate student

Productivity

15. number of acquired credits/exams
16. number of validated credits/exams (as a reckoning for extra-curricular activities)
17. average mark
18. (possibile) graduation vote
19. (possibile) enrollment in a post-graduate program

The data obtained from the administrative archive (personal information, previous schools, educational career at Sapienza³, productivity) underwent numerous re-codifications to make it suitable for a longitudinal analysis that would take into account, at any time, a student history career. In this way we could get a data matrix with diachronic structure.

Here we decided to consider Sapienza University as single context of analysis, ignoring its parts (as faculties and courses of study). The entire realized analysis also considers the mobility inside Sapienza (Fasanella, Benvenuto and Salerni, 2010; Decataldo, 2010). If the long desired national university student census existed, it would be possible to monitor these patterns within all the universities of Italian higher education system.

The operations of re-codification of data into a matrix and the creation of new variables have been necessary to obtain a final product characterized by 4 *multidimensional representations* of the educational paths of each cohort.

These representations were realized within the first educational path of every single student (a student's entire career until the achievement of his first degree). It wasn't, therefore, considered within this presentation, the continuation of the university career, for those who decided to carry on with their studies after the achievement of their first degree.

³ The comprehensive university career can be made up of several career fragments, started in different departments, with or without the accomplishment of a degree, spaced or not spaced out by one or more years of break.

Differently from the current longitudinal models (which make a simple comparison between the situation at a time t_0 – for example the time of enrollment – and the situation at a time t_1 – for example at the end of the legal duration of a course of study), this model aims at the reconstruction of the path that is the intermediate successive states between two moments, at the maximum mark of intension allowed by the regulations on the registration modes of the administrative positions of the students within the structure under study.

The created multidimensional representations considers the *administrative position* (which makes a distinction between still enrolled student, graduates and drop-outs) of each student at four observable conditions:

- a) in the passage from the first to the second year of the course of study (T_1);
- b) at the end of the legal duration of the course of study (T_2);
- c) at the first year exceeding the legal duration of the course of study (“fuori corso”) (T_3);
- d) at twice the legal duration of the course of study (T_4).

This kind of study allows for an accurate analysis of the changes in a double direction:

- 1) the comparison between the four representations (in the passage from the first to the second year of the course of study, at the legal duration, at the first year exceeding the legal duration, at twice the legal duration of the course of study), designed for each cohort makes it possible to investigate on the intra-cohort changes.
- 2) The comparison between the four multidimensional representations for each of the sixteen observed cohorts allows us to study the inter-cohort changes.

Here we are dedicating particular attention to the questions concerning the number and the quality of graduates (productivity).

3. Comparing careers

Tables from 1 to 3 allow to observe the administrative status of cohort members in the passage from the first to the second year of the course of study (T_1), at the end of the legal duration of the course of study (T_2), at the first year exceeding the legal duration of the course of study (T_3) and at twice the legal duration of the course of study (T_4). The first of these tables compares the Old order four year course with the New order three year course; the second compares the Old order five year course with the New order five year course; the third compares the Old order six year course with the New order six year course.

With reference to the dispersion, we may note that:

- during the Old order system, the percentage of the *early drop out* (drop outs in the passage from the first to the second year) in the four year courses of study (35.2%) is higher than the percentage of the *early drop out* in the five year (26.7%) and in particular in the six year (9%) courses.
- In the new order system, the percentage of the early drop out in the three year courses of study (27.1%) is higher than the percentage of the *early drop out* in the five year (19.5%) and in the six year (7.3%) courses.
- The number of early drop out in the New system courses is always lower than in the Old order courses of study.

As for the overall drop outs (*early and late drop outs*), we only can proceed in comparing only the Old order four year courses of study with the New order three year courses (in fact, in T_4 we cannot observed five year courses since the academic year 1998/1999 and six year courses since the 1996/1997). It is evident, however, that the total number of drop outs in the reformed three year courses (38.8%) is significantly lower than the unreformed four year course (56.3%). Therefore it may be argued that the university reform has been able to contain of the phenomenon of drop outs at least partly.

In regard to the students exceeding the legal duration of course of study (so called fuoricorsismo), the comparison is possible only between Old Order four year and New order three year courses. In addition, at twice the legal duration of the course of study (T₄) it is possible to observe only the cohort 2001/2002, while at the first year exceeding the legal duration of the course (T₃) it is possible to observe only the cohort from 2001/2002 to 2003/2004.

Observing available data we can note the proportion of the student exceeding the legal duration of the course of study has been unchanged in the transition from Old to New order. At twice of the legal duration, in fact, 19.8% of the triennial students and 18.6% of Old order four year courses students appear to still be student at Sapienza. Therefore the university reform has been not able to produce an approach between the legal duration of degree courses and the necessary real time for students to obtain a graduation.

With reference to the number of graduates, we may note that:

- during the Old order system, the percentage of *regular graduates* in the four year courses (1.5%) is lower than the percentage of *regular graduates* in the five year (7%) and in particular in the six year (34%) courses.
- In the New order system the percentage of *regular students* in the triennial courses (15.2%) is higher than the percentage of *regular students* in the five year courses (5.3%), but lower than the percentage in the six year courses (43.3%).
- The number of *regular graduates* in the New system degree courses is considerably higher than in the Old order degree courses (except for the five year courses).

As for the *total graduates* (regular and not), the comparison is possible only between Old Order four year and New order three year courses (in fact, in T₄ we cannot observe five year courses since the academic year 1998/1999 and six year courses since the academic year 1996/1997).

Observing available data we can note the *total graduate* number in triennial courses (41.4%) is significantly higher than the *total graduate* number in the four year courses (25.2%). It can be argued, therefore, that the reform has been able to increase the productivity of Italian university system.

Tables 4 and 5 illustrate a typology that concerns cohort members who obtained a degree within twice the legal duration of their course of study (T₄). The typology was made using graduation marks and the real time for students to graduate.

In consideration of the graduation mark range (from 66 to 110 cum laude), we evaluated as low-profile graduates who obtained their graduation with an equal or less mark than 88/110 and high-profile graduates who obtained their graduation with an equal or less mark than 88/110.

We defined also as:

- *regulars*, graduates within the legal duration of their course of study;
- *stragglers*, graduates at the first year exceeding the legal duration;
- *irregulars*, graduates within twice the legal duration.

We can observe the entire typology only referring to the 2001/2002 cohort in the New order and up to 1999/2000 cohort in the Old order.

Considering the population of graduates and taking into account the percentage of students with a high (graduation with a mark higher than 89) and regular (graduation within the legal duration of their course) profile, during the period preceding the reform Sapienza system seems doubly characterized:

- the percentage of subjects who obtained their graduation with an high mark corresponds to almost all cases (98%);
- the percentage of subjects who obtained their graduation within the legal duration of their course of study is extremely low (4.8%).

However, the regularity of careers always involves an high profile of marks (99.1% of graduates within the legal duration of the course has a high mark). In contrast, the high profile of mark almost never implies regularity of career: among graduates with high vote, 76.1% obtained graduation at

the first year exceeding the legal duration of the course of study and 19.1% graduated with a severe lateness (from the second to the fourth year exceeding the legal duration).

Even though these are all students from the same university (Sapienza), only a modest percentage of them (4.8%) seems to possess the necessary facilities to achieve the dual objective (regular and high profile). The 93.3% of cases seems to have only characteristics to achieve the high profile but not regularity.

In this way a state of idiosyncrasy has been established. Theoretically we could think that the most able students (those who are able to graduate with high marks) should be able to graduate on time, while the less able students have intended to graduate later. In fact, at Sapienza this hypothesis is not confirmed: as the less able (who constitute only 2% of population) as the most able (representing 98%) students show a disposition to graduate exceeding the legal duration of the course of study.

The disposition of Sapienza University to graduate students with high marks has substantially unchanged in the transition from the Old to the New order.

A first element of change is the increasing regularity in university careers: the regular graduates constituted 4.8% in the Old system, while in the New one they amounted to 34.1% of population.

A second element of change is the trend towards normalization of the relationship between regularity and high profit: regularity is more associated with high profit in the New order than it was in the Old order.

However the percentage of high profile students who graduated exceeding the legal duration of the course of study has remained still high (64.5%: 31.5% graduated at the first year exceeding the legal duration, 33% obtained their graduation at the second/third year exceeding the legal duration).

In the New order the irregularity of university careers is associated with low graduation marks. Comparing the Old order with the New one we can note that among the low profile graduates, subjects who graduated within the legal duration increase, while subjects who obtained their graduation exceeding the legal duration of the course of study decrease.

This shift toward the axis of regularity (also among the low profile graduates) would seem to underlie a principle of normalization: the degree can be obtained within legal duration of the course of study regardless of the graduate profile differences.

Tab. 1 – Old order (four year courses) vs. New order (three year courses): careers (%)

<i>academic years</i>	<i>enrolled (a.v.)</i>	T₁ in the passage from the first to the second year of the course of study (%)		T₂ at the end of the legal duration of a course of study (%)			T₃ at the first year exceeding the legal duration of the course of study (%)			T₄ at twice the legal duration of the course of study (%)		
		<i>stationary students</i>	<i>drop outs</i>	<i>stationary students</i>	<i>graduates</i>	<i>drop outs</i>	<i>stationary students</i>	<i>graduates</i>	<i>drop outs</i>	<i>stationary students</i>	<i>graduates</i>	<i>drop outs</i>
1991/1992	23.918	65,2	34,8	53,8	,9	45,4	46,5	5,0	48,4	21,6	23,3	55,1
1992/1993	21.948	68,8	31,2	55,4	,8	43,8	47,7	4,9	47,4	21,5	23,8	54,7
1993/1994	22.213	66,9	33,1	52,5	,9	46,6	44,5	5,1	50,4	20,3	22,6	57,1
1994/1995	21.729	66,7	33,3	51,9	1,0	47,1	44,6	4,7	50,6	18,9	23,7	57,4
1995/1996	20.069	62,4	37,6	48,0	1,0	51,0	40,9	4,9	54,2	17,3	23,6	59,1
1996/1997	17.663	61,4	38,6	47,2	,8	52,0	39,5	5,4	55,1	16,3	24,8	58,9
1997/1998	14.637	62,3	37,7	48,1	1,1	50,7	40,2	7,0	52,8	15,9	28,1	56,1
1998/1999	12.051	63,8	36,2	50,2	2,6	47,2	41,2	9,8	49,0	15,5	32,2	52,4
1999/2000	9.672	62,3	37,7	49,0	3,7	47,3	39,2	12,2	48,6	14,4	32,9	52,7
2000/2001	8.375	64,1	35,9	49,5	6,8	43,7	37,3	17,0	45,7	-	-	-
Old order total	172.275	64,8	35,2	51,0	1,5	47,5	43,1	6,5	50,5	18,6	25,2	56,3
2000/2001*	1.610	80,2	19,8	61,9	14,6	23,5	45,0	29,9	25,1	23,6	47,1	29,3
2001/2002	20.046	73,2	26,8	54,6	14,2	31,1	38,0	27,0	34,9	19,5	41,0	39,6
2002/2003	22.004	74,1	25,9	53,1	15,4	31,4	37,1	27,9	35,0	-	-	-
2003/2004	23.222	71,0	29,0	50,7	14,7	34,6	35,6	26,6	37,9	-	-	-
2004/2005	20.385	73,0	27,0	50,7	16,4	32,8	-	-	-	-	-	-
2005/2006	20.295	73,0	27,0	-	-	-	-	-	-	-	-	-
New order total	107.562	72,9	27,1	52,4	15,2	32,4	37,0	27,2	35,7	19,8	41,4	38,8

* Here we report only the courses of the Faculty of Engineering where the Reform was experimentally introduced one year in advance.

Tab. 2 – Old order (five year courses) vs. New order (five year courses): careers (%)

<i>academic years</i>	<i>enrolled (a.v.)</i>	T₁ in the passage from the first to the second year of the course of study (%)		T₂ at the end of the legal duration of a course of study (%)			T₃ at the first year exceeding the legal duration of the course of study (%)			T₄ at twice the legal duration of the course of study (%)		
		<i>stationary students</i>	<i>drop outs</i>	<i>stationary students</i>	<i>graduates</i>	<i>drop outs</i>	<i>stationary students</i>	<i>graduates</i>	<i>drop outs</i>	<i>stationary students</i>	<i>graduates</i>	<i>drop outs</i>
1991/1992	10.649	67,8	32,2	52,9	2,2	44,8	45,3	7,5	47,2	18,1	29,2	52,7
1992/1993	10.337	70,3	29,7	54,2	2,8	43,0	46,2	8,5	45,2	16,6	32,6	50,9
1993/1994	9.570	71,1	28,9	54,1	3,5	42,5	45,2	9,5	45,4	15,8	33,9	50,2
1994/1995	7.569	77,1	22,9	59,6	4,5	35,9	49,2	12,0	38,8	15,2	41,7	43,1
1995/1996	6.932	76,7	23,3	58,4	4,8	36,8	47,2	13,7	39,0	13,8	43,7	42,5
1996/1997	6.735	75,7	24,3	58,1	4,4	37,5	46,5	14,7	38,8	12,5	45,4	42,1
1997/1998	6.886	73,0	27,0	56,5	6,1	37,4	43,7	17,9	38,5	11,6	46,3	42,1
1998/1999	7.122	73,2	26,8	56,3	8,8	34,9	42,7	21,7	35,6	-	-	-
1999/2000	8.896	76,0	24,0	53,1	15,2	31,7	37,1	30,1	32,9	-	-	-
2000/2001	8.169	75,9	24,1	48,8	19,4	31,9	34,4	32,1	33,4	-	-	-
Old order total	82.865	73,3	26,7	54,9	7,0	38,1	43,7	16,3	40,0	15,2	37,8	47,1
2001/2002	797	75,4	24,6	58,0	5,3	36,8	46,3	13,7	40,0	-	-	-
2002/2003	1.055	81,2	18,8	64,0	5,3	30,7	-	-	-	-	-	-
2003/2004	925	80,4	19,6	-	-	-	-	-	-	-	-	-
2004/2005	1.061	81,1	18,9	-	-	-	-	-	-	-	-	-
2005/2006	624	84,6	15,4	-	-	-	-	-	-	-	-	-
New order total	4.462	80,5	19,5	61,4	5,3	33,3	46,3	13,7	40,0	-	-	-

Tab. 3 – Old order (six year courses) vs. New order (six year courses): careers (%)

<i>academic years</i>	<i>enrolled (a.v.)</i>	T₁ in the passage from the first to the second year of the course of study (%)		T₂ at the end of the legal duration of a course of study (%)			T₃ at the first year exceeding the legal duration of the course of study (%)			T₄ at twice the legal duration of the course of study (%)		
		<i>stationary students</i>	<i>drop outs</i>	<i>stationary students</i>	<i>graduates</i>	<i>drop outs</i>	<i>stationary students</i>	<i>graduates</i>	<i>drop outs</i>	<i>stationary students</i>	<i>graduates</i>	<i>drop outs</i>
1991/1992	725	90,3	9,7	53,9	27,7	18,3	39,9	41,1	19,0	10,6	65,1	24,3
1992/1993	731	91,2	8,8	53,6	29,3	17,1	42,0	40,6	17,4	10,4	69,9	19,7
1993/1994	693	91,3	8,7	50,9	34,8	14,3	34,5	50,1	15,4	8,1	73,7	18,2
1994/1995	635	90,7	9,3	49,9	34,5	15,6	34,6	49,3	16,1	8,0	72,9	19,1
1995/1996	658	91,2	8,8	52,1	32,4	15,5	38,4	45,9	15,7	8,4	72,8	18,8
1996/1997	653	94,0	6,0	49,8	37,5	12,7	33,7	53,6	12,7	-	-	-
1997/1998	516	91,5	8,5	48,6	35,1	16,3	31,2	51,9	16,9	-	-	-
1998/1999	346	86,4	13,6	49,4	32,7	17,9	35,3	46,2	18,5	-	-	-
1999/2000	535	90,8	9,2	46,2	42,2	11,6	31,2	56,6	12,1	-	-	-
2000/2001	511	90,6	9,4	48,3	37,4	14,3	33,7	50,1	16,2	-	-	-
Old order total	6.003	91,0	9,0	50,6	34,0	15,4	35,8	48,2	16,0	9,2	70,8	20,1
2001/2002	127	95,3	4,7	49,6	43,3	7,1	-	-	-	-	-	-
2002/2003	120	92,5	7,5	-	-	-	-	-	-	-	-	-
2003/2004	133	93,2	6,8	-	-	-	-	-	-	-	-	-
2004/2005	121	92,6	7,4	-	-	-	-	-	-	-	-	-
2005/2006	116	89,7	10,3	-	-	-	-	-	-	-	-	-
New order total	617	92,7	7,3	49,6	43,3	7,1	-	-	-	-	-	-

Tab. 4 - Old order (four year courses) vs. New order (three year courses): typology of graduates at T₄ (%)

Old order – four year courses				
Graduation mark	graduates			Total
	regulars	latecomers	irregular	
low mark	2,2	6,5	91,3	100
	0,9	0,7	2,3	2,0
	0,04	0,1	1,8	
high mark	4,9	19,1	76,1	100
	99,1	99,3	97,7	98,0
	4,8	18,7	74,6	
Total	4,8	18,8	76,4	100
	100	100	100	100
New order – three year courses				
Graduation mark	graduates			Total
	regulars	latecomers	irregulars	
low mark	8,3	27,7	64,0	100
	0,9	3,3	7,0	3,7
	0,3	1,0	2,4	
high mark	35,5	31,5	33,0	100
	99,1	96,7	93,0	96,3
	34,1	30,3	31,8	
Total	34,5	31,4	34,2	100
	100	100	100	100

Tab. 5 - Old order (four year courses) vs. New order (three year courses): typology of graduates at T₄ for cohorts

Academic years	Low profile regulars	High profile regulars	Low profile latecomers	High profile latecomers	Low profile irregulars	High profile irregulars
1991/1992	0,04	3,7	0,1	17,8	1,4	76,9
1992/1993	0,04	3,2	0,1	17,1	1,6	77,9
1993/1994	0,1	4,0	0,2	18,2	2,5	75,0
1994/1995	0,1	4,2	0,1	15,5	2,0	78,1
1995/1996	-	4,2	0,1	16,3	1,6	77,8
1996/1997	0,1	3,2	0,1	18,6	1,7	76,3
1997/1998	0,0	3,9	0,1	20,7	1,4	73,8
1998/1999	0,03	8,1	0,1	22,1	1,6	68,0
1999/2000	0,03	11,2	0,2	25,6	2,2	60,7
Old order total	0,04	4,8	0,1	18,7	1,8	74,6
2000/2001*	0,3	30,7	0,8	31,7	4,1	32,5
2001/2002	0,3	34,5	1,1	30,2	2,2	31,7
New order total	0,3	34,1	1,0	30,3	2,4	31,8

* Here we report only the courses of the Faculty of Engineering, where the Reform was experimentally introduced one year in advance.

4. Profiles of graduates

Observing paths of New and Old system cohorts we analyzed students' equipment during the moment of their enrollment to consider if there were already relevant particulars to expect of their graduation.

In the Old order, the gender variable is essentially irrelevant to the academic achievement. In fact, on one side it is noticeable a movement toward the pole of high profile in the entire student population (the high profile students are 98.1%; they have a characterization as regulars in 4.8%, latecomers in 18.7% and irregulars in 74.6% of cases), on the other side there is a similar movement in the two gender segments (the high profile women are 98.8% and the high profile men are 96.7%; the women have a characterization as regulars in 4.6%, latecomers in 19.2% and irregulars in 75% of cases; the men have a characterization as regulars in 5%, latecomers in 17.8% and irregulars in 73.9%).

Even in the New system the gender differentiation does not seem to have a significant impact on the academic achievement profiles. Although these profiles are numerically very small, we note only a reversal of the relationship between two genres in favor of men. However this reversal characterizes the weaker profiles (those who are the latecomers and the irregulars).

In the Old system the student population is mainly composed of 19 years old individuals (over 5/6 of total). Within this segment, the variable values relating to academic achievement tend to be distributed in a pattern which is identical to that observed in the whole population. In the other segments of population, the differences are not relevant, except in the case of over 26 years old students, who constitute a very minor part of population (1.9%). Within this class the number of those who tend to be regular students with an high profile is greatly increased in front of the population average (19.2% vs. 4.8%). In contrast, the proportion of those who excel and, in the same time, have an irregular career decreases significantly (the high profile irregulars are 55.3% in the 26 years old class and 74.6% in the entire population).

This fact is very interesting because in hypothesis the older students have less resources (especially time) to invest in their studies. However, a greater motivational incentive, an upper skills equipment and adaptive patterns (probably borrowed from their work experience) could be associated to an higher age. Probably these elements are able to promote a higher capacity of responding to the university system demands. On the contrary, these resources are not prerogative of new comers, who are more connected to socialization traditional patterns that are typical of secondary school and significantly away from the dynamics of the university organizational system.

Comparing to the Old order, in the New one the percentage of higher age graduates increases (even if for a little percentage): this data is coherent with the Reform goals that aimed to democratize educational opportunities and knowledge diffusion.

The most interesting aspect concerns the stronger association between high profile and regular career within the older age segments. This fact already emerged during the analysis of the Old system: objectively pre-reform courses permitted a less rigorous organization of study, which allowed the activities of the older students. However, the offer introduced by the reform involves more exacting student workloads (frequenting lessons, participating in workshops, writing essays and individual papers, studying classical texts) that would be binding for older students.

The data might suggest the capacity of university structures to offer courses of study which are also able to bring on the older student needs from an organizational point of view. The problem is that the movement toward the pole of high profile - regular career is only noticeable in the older graduates segment, but not the younger graduates class (the younger graduates are more than 3/4 of all graduates). This result suggests a high coherence between specific segments of students and courses of study.

In the Old order residence variable is also irrelevant to academic achievement. This data seems to support (as in the case of age variable) the hypothesis available time resources (that are theoretically

higher in local residence students than non local residence students) to determine differences in academic achievement.

Even in the New order residence variable is absolutely irrelevant to academic achievement. However we must underline a significant increase of non local students (they are 26.8% in the New Order and 16.2% in the Old one). The Sapienza enrollment trend follows the national trend which is characterized by an increase of enrollments during the introduction of so called "3+2" reform. Nevertheless, Sapienza average seems to suffer thinning process of student population more than national average: Sapienza population has become from 35,258 new units (enrollments) during the academic year 1999/2000 to 19,253 in 1999/2000 and 18,794 in succeeding academic year. This phenomenon is associated with the spreading of new universities throughout the Italian territory. In fact, during the period from 1980 to 2000 the number of Italian universities increased from 58 to 77; this fact determined a redistribution of enrollments in every university. Since 2001/2002 a turnaround, which is destined to be amplified in later years, has been registered at Sapienza (that had 20,047 enrollments during this year) in contrast with the national university system trend. Since 2001/2002 Sapienza has exercised the greatest appeal of degree courses, which became from 80 (in the Old order latest academic year 2000/2001) to 176 (in the New order first academic year 2001/2002). In this way Sapienza (that is a traditional university) has been able to intercept the educational demand of newcomers more than new universities during a period characterized by uncertainty and perceptible elements.

If we consider the impact of educational equipment at the moment of enrollment, we will note it is quite small and it does not lead off relevant appreciable differences.

In the Old order the trend of academic achievement variable is similar in each segment of graduates with different high school degree and in all graduate population. Some interesting differences are registered toward the pole of irregular profile among the graduates with technical and non-traditional high school degrees. In contrast, interesting differences are registered toward the pole of regular profile among the graduates with traditional high school degree. A strong tendency to high profile is confirmed in all high school degree segments of population. The data might suggest these students made a coherent choice with their own high school degree at the moment of their enrollment.

Even in the New order high school variable is irrelevant to the distribution of academic achievement variable, regardless of the difference about a movement toward the pole of high and regular profile as we discussed above.

Referring to the Old order the percentage of high profile regulars is 7.4% in the segment of graduates with excellent high school degree mark, while it is 3.4% in the segment of graduates with the lowest high school degree mark and 4.6% in the entire graduate population. Moreover, in this segment the 66.8% of individuals obtained their graduation with high mark, but with a delay from 2 to 4 years exceeding the legal duration of the course of study. Conversely, in the segment of population with the lowest high school degree mark the percentage of low profile irregulars is 5.1%, while it is 0.4% in the segment of graduates with excellent high school degree mark and 1.8% in the entire graduate population. Also in this subgroup, the 79.8% of graduates obtained their graduation with excellent high school degree mark, but exceeding the legal duration of their degree course very much.

In fact, the short distance between opposing levels of qualification is surprising when it is compared with the predisposition to graduate with excellent degree marks: in the segment of population with excellent high school degree marks almost all (99.5%) individuals obtained their graduation with excellent degree marks; in the segment of population with the lowest high school degree marks the percentage of graduates with excellent degree marks decreases is reduced by less than 10 points (in fact it is 91.1%).

Even in the New order we can observe a trend of high school degree mark variable that is similar to the Old order trend. The high profile is not a prerogative of the graduates with excellent high school

degree marks: this segment is consisting of 98.6% of high profile graduates, in the same way the opposite segment (that is represented by graduates with low high school degree marks) is characterized by 92.3% of high profile graduates.

As we have observed about the Old order, a regular career is more associated to an excellent high school degree mark than to a low high school degree mark (which is more predictive of an irregular career).

The actual element of change is a movement toward the pole of regular and high profile, which is able to collect the 34.6% of graduates (while this percentage is 4.8 in the Old order). In contrast, the pole of irregular and high profile becomes from 74.6% in the Old order to 31.4% in the New one.

Now we can evaluate if the observed trends are confirmed in the different faculties existing at Sapienza during the Old order and the New one (before the reorganization of Italian universities that was imposed by the DM 240/10, the so-called Gelmini Reform).

In fact, the trends of academic achievement variable are very similar among faculties, with the exception of cases (tab. 6):

- Political Science and Economy faculties, where the association between irregular career and high profile seems to increase;
- Statistical Sciences and Mathematic, Physic and Natural Sciences faculties, where the association between regular career and high profile seems to increase.

Moreover, in the Law Faculty almost 60% of irregular and low profile graduates students is concentrated.

The data suggest Old order Sapienza takes the form of a giant meat grinder: on one side it expels significant portion of students, on the other one it is able to standardize its products.

The various equipments of different students at the moment of enrollment were subjected to the action of complex mechanisms. In this way they tend to lose their property, to get mixed up each other until the formation of a homogeneous final result: the Sapienza graduate. The original characteristics of this product are not easily recognizable; it has a very low degree of differentiation: it is uniformly characterized by irregular career and high profile. "Good and Slow", this could be the formula that identifies the product "Sapienza graduate."

It seems the achievement of degree might request a necessary, defined and informal step to all graduates. This step (in terms of stages and times) is substantially impermeable to the equipments of students at the moment of enrollment. There would be no input characteristics that can make more or less easy and quick this step.

During their career students seem to acquire an additional equipment, by which they will obtain their degree: almost always exceeding the legal duration of their degree courses, almost always with high marks.

In the New order we can note almost all students of both Medicine faculties obtain their degree during the legal duration and with excellent profile (86.5% and 77.6%). These faculties, as Statistical Science Faculty (where the 48.5% of graduates are high profile regulars), had already experienced three year degree courses during the Old system and, therefore, have already been socialized in such a system.

In general, you can not observe important changes comparing the New order to the Old one about the possibility of allocating "predictive capabilities" to the equipments of students at the moment of enrollment. However, we must emphasize a greater democratization of educational opportunities in the New order. This democratization tends to favor (in terms of duration and quality of university career) the older students.

Tab. 6 - Old order (four year courses) vs. New order (three year courses): typology of graduates at T₄ for Faculties (%)

<i>Old order – four year courses</i>					
<i>High profile regulars</i>		<i>High profile latecomers</i>		<i>High profile irregulars</i>	
Statistical science	8,6	Political science	12,8	Statistical science	65,9
Mathematic, Physic and Natural sciences	6,9	Economy	15,9	Pharmacy	66,8
Humanities and Philosophy	6,3	Law	18,7	Mathematic, Physic and Natural sciences	72,2
Pharmacy	6,1	Sapienza	18,7	Humanities and Philosophy	72,7
Sociology	5,6	Sociology	20,1	Sociology	73,2
Sapienza	4,8	Mathematic, Physic and Natural sciences	20,1	Law	73,2
Law	4,0	Humanities and Philosophy	20,7	Sapienza	74,6
Economy	3,1	Pharmacy	22,0	Economy	79,1
Political science	1,9	Statistical science	24,6	Political science	83,1
<i>New order – three year courses</i>					
<i>High profile regulars</i>		<i>High profile latecomers</i>		<i>High profile irregulars</i>	
Medicine and Surgery 2	86,5	Medicine and Surgery 2	8,7	Medicine and Surgery 2	1,6
Medicine and Surgery 1	77,6	Medicine and Surgery 1	15,8	Medicine and Surgery 1	4,2
Statistical science	48,5	Mathematic, Physic and Natural sciences	27,7	Law	18,7
Architecture Quaroni	47,3	Statistical science	27,8	Psychology 2	20,9
Phylosophy	44,3	Engineering	28,4	Architecture Quaroni	21,9
Psychology 1	38,9	Psychology 1	28,5	Statistical science	22,7
Humanities and Philosophy	38,1	Political science	29,0	Phylosophy	24,6
Psychology 2	36,1	Sapienza	30,3	Psychology 1	26,0
Engineering	35,2	Phylosophy	30,5	Humanities and Philosophy	27,9
Sapienza	34,1	Architecture Quaroni	30,5	Engineering	30,9
Mathematic, Physic and Natural sciences	28,4	Architecture Valle Giulia	31,0	Sapienza	31,8
Humanities	28,0	Economy	31,3	Humanities	33,2
Law	25,7	Psychology 2	32,4	Oriental studies	38,0
Oriental studies	23,4	Humanities and Philosophy	33,8	Mathematic, Physic and Natural sciences	42,6
Communication science	19,4	Sociology	34,2	Communication science	43,5
Economy	17,8	Communication science	34,2	Economy	44,3
Architecture Valle Giulia	11,9	Pharmacy	36,4	Sociology	55,3
Sociology	10,0	Oriental studies	38,6	Architecture Valle Giulia	56,0
Political science	4,1	Humanities	38,8	Political science	62,4
Pharmacy	0,0	Law	49,5	Pharmacy	63,6

5. Concluding remarks

At the end we try to apply the same typology (that has been introduced in Tab. 4) to all three year graduates of the New order observed cohorts. In Table 7 we can see the number of high profile regulars has been lowered some years after the introduction of “3+2” Reform (it is 11.6% versus

34.1% of the single 2001/2002 cohort, as we can see in the tab. 4). It is becoming similar to the Old system number of high profile regulars (3.4%, as we can see in the tab. 4). It would seem the New system is gradually returning to pre-reform levels of productivity (lengthening the time necessary to graduate) after a positive initial push - as we can also read in the last AlmaLaurea report (2011).

Tab. 7 - Old order (four year courses) vs. New order (three year courses): total typology of graduates (%)

	Old order	New order
Low profile regulars	0,02	0,1
High profile regulars	3,4	11,6
Low profile latecomers	0,1	0,4
High profile latecomers	13,3	10,3
Low profile irregulars	2,9	2,2
High profile irregulars	80,3	75,5
Total	100 (57.257)	100 (26.476)

This frame seem show the changes, which were introduced by the DM 509/99 and its subsequent amendments, have not a radical character. Therefore, the concerns, which are felt within the university world, appear legitimate.

The main difficulties seem to be due to Italian university system (Sapienza system in this specific case) because the adopted research design (in consideration of the substantial equivalence of pretest and posttest of population) permit to identify the (few) changes in 'outcome of student careers' which depend to the introduction of experimental variable (that is the so-called "3+2" Reform).

There are two main strategies to face the problems of productivity in Italian universities:

- the first one might be called *inclusive strategy*. It involves human resources and economic investments.
- The other one might be called *intollerant strategy*. It could be implemented at "no cost" (the way that would suggest Gelmini Reform).

The inclusive strategy implies a strong planning of implementation and evaluation engagement in re-organization and management (about administration, space, services, etc.); effectively re-planning degree courses (referring to institutional regulations, number of necessary exams to obtain an university degree, number of educational modules, etc.); appropriately rethinking of teacher's activities (about course programs, type of teaching, etc.); planning and implementation interventions aimed at prevention and recovery of dropping out and irregular career (ex ante and in progress actions guidance and tutoring, such as differential care of students, possibility part-time enrollment for working students, the tutoring educational activities and tutoring graduate, etc.) (Decataldo and Ricotta, 2007) by the universities. These activities are able to attract students and they accompany them toward the university degree goal. However the implementation of the envisaged measures would be possible only if a reversal of the decrease of public resources involved in research and higher education was realized in Italy.

The intolerant strategy would imply more expeditious and cheaper activities, such as an energetic selection at enrollment moment (preventing the enrollment of those students who are weaker for skills and motivation); the tax increase according to the irregularities of university career (to discourage student retention beyond the legal duration of degree courses); the preparatory aspects in the possibility to take exams (to push the students out with greatest difficulties), etc. These activities are able to attract and to accompany toward the university degree goal only the most motivated and talented students, who do not need to support action.

Also, if the university system could change itself, we should carry out a reflection *on didactic load* (didactic credit): this is the possible producer of exceeding legal duration careers. In fact, we could suggest the existence of a gap between *legal didactic load* (which is required to each student) of

educational programs and *actual didactic load* (which is necessary to each student to obtain his university degree (Decataldo e Carci, in press).

The simplification, which is introduced by the DM 270/04, seems unable to produce the expected results because in the New system, unlike in the Old one, a decrease of the didactic modules and exams number does not match to a reduction of didactic load (because the number of credits to graduate is always 180).

An extra effort should be directed to the degree thesis procedures, that are probably still too dispersive and not entirely unrelated to the Old order logic.

If we could solve the productivity problem of the Italian university, then we would design activities related to the placement of graduates into the job market. In fact, the latest AlmaLaurea report (2011) stresses the Italian graduates must confront with growing difficulties to enter the job market at the end of a long, laborious and expensive university career. Therefore, despite the young graduates constitute a small proportion of Italian population, they are not very attractive to Italian job market. The problem seems not be in a mismatch between job market requests and graduate offering. According to national and international official reports, the Italian problem is primarily the public and private non-investment in education, research and development (OECD, 2010).

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