

Evaluating the D.M. 509/99 reform of the Italian university system: methods and empirical evidence from the analysis of MIUR data¹

La valutazione d'impatto della riforma del sistema universitario (D.M. 509/99): metodi ed evidenze empiriche dall'analisi dei dati dell'ufficio statistica del MIUR

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Riassunto: L'obiettivo del presente lavoro è stimare l'impatto netto della riforma dei cicli e degli ordinamenti didattici (ex D.M. 509/99) utilizzando i dati dell'Indagine sull'Istruzione Universitaria dell'Ufficio di statistica del MIUR. Stante l'ancora recente data di introduzione della riforma, l'ambito di analisi è limitato all'impatto della riforma sulle immatricolazioni, sulla percentuale di studenti che non abbandonano la facoltà negli anni successivi all'immatricolazione e sulla percentuale di studenti immatricolati che conseguono la laurea in corso. I risultati dell'analisi sono robusti rispetto ad una ampia gamma di diverse forme funzionali del modello di stima e permettono di quantificare con buona precisione statistica gli effetti della riforma al netto delle principali variazioni prodotte da altri concomitanti fattori di cambiamento.

Keywords: Statistical methods for impact evaluation, university systems.

1. Introduction

This paper is aimed at evaluating the net impact of the D.M. 509/99 Italian University reform² on a number of outcomes of interest using data from the "Indagine sull'Istruzione Universitaria" by the "Ufficio di statistica" of MIUR. Given the recent introduction of the reform (which occurred in the academic years 2000/01 and 2001/02) the outcomes of interest that can be used to assess the impact of the reform are: number of student enrolled in the first year of an undergraduate ("Laurea") University program; percent of students enrolled in the first year of a "Laurea" program that are still enrolled in the same college ("sede di Facoltà") in the subsequent academic years; percent of students that earn a "Laurea" degree within the standard number of academic years indicated by the program curriculum.

¹ The research study that provides the basis for this paper has been commissioned by the CNVSU- "Comitato Nazionale per la Valutazione del Sistema Universitario" in December 2004.

² The D.M. 509/99 reform shortened to three academic years the length of most of the undergraduate Laurea programs and introduced two-year graduate Laurea programs open to students holding an undergraduate Laurea degree.

2. Methods of analysis

Impact estimates are retrieved using data covering the academic years from 1998/99 to 2003/04, aggregated at the college level (“sedi di Facoltà”). The data sample includes all “sedi di Facoltà” from all Italian University (with the exclusion of the “Università per Stranieri”, “Istituti e Facoltà di Scienze Motorie” and “Istituti Superiori di Educazione Fisica”).

The net impact of the reform on the number of students enrolled in the first year of Laurea programs has been estimated by the following fixed effects longitudinal model:

$$\ln(Y_{i,t}/Y_{i,t-1}) = \sum_{\tau=1}^{IV} \beta_{\tau} (REF_{\tau})_{i,t} + \delta \Delta PROG_{i,t} + \sum_{\nu=1}^{35} \theta_{\nu} (COL_{\nu})_{i,t} + \phi DIM_i + \omega MAIN_i + \eta COMP_{i,t} + \lambda \ln(HSG_{i,t}/HSG_{i,t-1}) + \sum_{s=1998}^{2003} \lambda_s YEAR_s + \Delta \varepsilon_{it} \quad (1)$$

To identify the net impact of the reform [estimated through the variables REF_1 ..., REF_{IV}], signalling whether or not a “sede di Facoltà” i at time t implemented the reform for the first, second, third or fourth consecutive year], the model of eq. (1) exploits both the before-after-reform difference in the student enrolment trend and the fact that a first group of “sedi di facoltà” (*Group 1*) introduced the reform starting from the 2000/01 academic year, while the remaining “sedi di facoltà” (*Group 2*) started the reform from the subsequent academic year (2001/02). Thus, over the post-reform academic years, the group of “sedi di facoltà” that did not start the reform in 2000/01 (*Group 2*) is capable of providing some counterfactual information in order to disentangle enrolment outcomes due to the reform from outcomes due to unrelated temporal trends. Of course *Group 1* may have different characteristics (type of college degrees offered, geographic location, size, etc...) than those of *Group 2*. Such different characteristics may produce impact estimates with selection bias if they are not carefully controlled for. To limit selection bias threats, in the model of eq. (1), the dependent variable has been first differenced in order to eliminate the “sedi di Facoltà”-specific fixed effects³. Moreover, the model also includes a set of control variables that enables impact estimates of the reform implementation to be net of trends in the enrolment outcomes accounted for by: the type of college degrees offered by a “sede di facoltà” i [set of binary variables COL_1 .. COL_{35} signalling whether or not i offers degrees in economics, law, political science, sociology, etc...]; the pre-reform size of i , in terms of total number of students enrolled (variable DIM_i); whether or not i is the main campus of the college (variable $MAIN_i$) and i is located in the administrative-head-city of the region (“capoluogo di regione”); variations in the number of undergraduate Laurea programs offered by other “sedi di facoltà” located with the same province of i (variable $\Delta COMP_{i,t}$); yearly variations in the number of high-school graduates that can enrol in the undergraduate Laurea programs of “sede di facoltà” i (variable $\ln(HSG_{i,t}/HSG_{i,t-1})$). Besides estimating the net impact of the reform, finally, the model of eq. (1) also estimates whether or not, within a same “sede di facoltà”, increasing the number of

³ The model of eq. (1) results from first-differencing a specification in which all of the independent variables affect the dependent variable through a linear growth trend.

diversified Laurea programs did pay off in terms of boosting the number of first-year enrollees (variable $\Delta PROG_{i,t}$) [an important issue in the debates surrounding the reform].

Eq. (2) illustrates the model to estimate the net impact of the reform on the percent of students enrolled in the first year of a Laurea program that are still enrolled in the same “sede di Facoltà” in the next academic year:

$$\begin{aligned} \left[\left(\frac{Y^*_{i,t+1}}{Y_{i,t}} \right) - \left(\frac{Y^*_{i,t}}{Y_{i,t-1}} \right) \right] = & \sum_{\tau=1}^{IV} \beta_{\tau} \Delta REF_{i,t} + \delta \Delta PROG_{i,t} + \sum_{\nu=1}^{35} \theta_{\nu} COL_{\nu,i,t} + \phi DIM_i \\ & + \omega MAIN_i + \eta COMP_{i,t} + \Delta \varepsilon_{it} \end{aligned} \quad (2)$$

Similarly as in eq. (1), the dependent variable in eq. (2) has been first differenced (in order to eliminate the “sedi di facoltà”-specific fixed effects) and the model allows the impact of the reform to be different in each of the three or four academic year in which it was implemented. To estimate the impact of the reform on the percent of students still enrolled after two and three academic years past their first enrolment in the Laurea program, the dependent variable of eq. (2) is substituted with $\left[\left(\frac{Y^*_{i,t+2}}{Y_{i,t}} \right) - \left(\frac{Y^*_{i,t+1}}{Y_{i,t-1}} \right) \right]$

and $\left[\left(\frac{Y^*_{i,t+3}}{Y_{i,t}} \right) - \left(\frac{Y^*_{i,t+2}}{Y_{i,t-1}} \right) \right]$, respectively.

Evaluating the net impact of the reform on the percentage of first year students that earn a Laurea degree within the standard number of academic years indicated by the program curriculum is facilitated by quasi-experimental conditions. Such conditions arise because in each “sede di facoltà” included in the data sample, both new and pre-reform Laurea programs were by large running at the same time during the academic years 2000/01-2003/04, making possible to observe outcomes from both the treatment and the quasi-counterfactual status (represented by the outcomes from the new- and the pre-reform-Laurea programs, respectively). For this reason, net impact estimates of the reform are retrieved through a simple “pre-post comparison group design” in which the weighted average values of the percentage of the first-year students that graduated

within the standard number of academic years $\sum_i \left[\left(\frac{DEG_{i,t+n}}{Y_{i,t}} \right) * \left(\frac{Y_{i,t}}{\sum_i Y_{i,t}} \right) \right]$ are compared

between the new Laurea programs and the pre-reform Laurea programs.

3. Results

Figure 1 describes the pre-post-reform temporal trend in the aggregated count of first-year enrolled students (computed on the 482 “sedi di facoltà” that started the reform in the 2001/02 academic year –*Group 2*). The graph of Figure 1 shows a sharp increase in the number of enrolled students in the post-reform academic years, compared to pre-reform years (20.6% increase in three academic years, 6.9% average yearly increase). Such evidence, however, is only informative of the net impact of the reform implementation. Estimating the model of eq. (1) attempts to disentangle changes due to the reform from those due to other factors such as demographic changes in the young population and changes in students’ preferences for specific types of “Laurea degrees”,

number of laurea degrees offered by competitive “sedi di facoltà” and attractiveness of different geographic locations.

Figure 1 –Aggregate count of first-year enrolled students per academic year

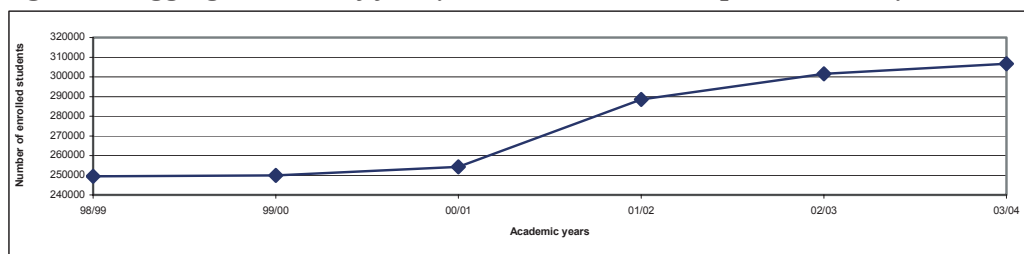


Table 1 summarizes the results from estimating the model of eq. (1) either excluding or including the subset of 72 (out of 514) “sedi di facoltà” that either started or ceased operating during the 1998/99-2003/04 period. Considering exclusively the subset of 442 “sedi di facoltà” always in existence during the 1998/99-2003/04 period (top portion of Table 1), net impact estimates of the reform implementation are: +8.3 and +12.2 percentage points in the yearly rate of variation in the number of first-year-enrolees, respectively for the first and second year of reform implementation. In its third and fourth year of implementation the reform is not shown to produce any further significant change on the yearly rate of variation in the number of first-year-enrolees (a result, however, that highlights how the gains reached with the first two years of the reform implementation are not lost in the subsequent years). When enlarging the data sample to include also the subset of “sedi di facoltà” that either started or ceased operating during the 1998/99-2003/04 period (bottom portion of Table 1), results show a positive impact on the yearly rate of variation in the number of first-year-enrolees throughout the four years of the reform implementation: +9.6; +14.8; +15.9 and +13.2 percentage points for the first, second, third and fourth year of implementation, respectively.⁴

Table 1 –Reform impact estimates based on the analysis of MIUR data

<i>“Sedi di facoltà” always in existence during the 1998/99-2003/04 period</i>	<i>Reform impact estimate</i>	<i>P-value</i>
<i>Dep.var. = yearly % variation [t-(t-1)] on the number of first-year enrollees</i>		
1st year of the reform	+0,083	0,025
2nd year of the reform	+0,122	0,022
3rd year of the reform	+0,046	0,487
4th year of the reform	-0,005	0,955
<i>All “sedi di facoltà”</i>		
<i>Dep.var. = yearly % variation [t-(t-1)] on the number of first-year enrollees</i>		
1st year of the reform	+0.096	0.005
2nd year of the reform	+0.148	0.000
3rd year of the reform	+0.159	0.001
4th year of the reform	+0.132	0.046

⁴ Further discussion of the results, together with the impact estimates of the reform implementation on the percent of students still enrolled in the same “sede di facoltà” and on the percent of students earning a College degree within the standard number of academic years are omitted for space constraints. Also omitted, for space constraints, are bibliographic references and results of the sensitivity analysis. All missing information can be found in a lengthier version of this paper available upon request to the author.