Inequality and higher education in Italy
The distributive impact of fees and subsidies to academics

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Abstract

In this paper we evaluate in monetary terms the benefits from attending a post-secondary degree in an Italian university. We also propose a microsimulation model that takes into account the spatial distribution of scholarships, fees and other monetary and in-kind services related to the university sector. In this way, it is possible to obtain a good approximation of the real net benefit gained from attending a post-secondary Italian degree and to study its distributive impact on both the users and the whole Italian population. We will provide evidence that the benefits from public higher education have universalistic features. However, the tax-system that is applied by each university is slightly regressive whilst subsidies have a high potential in terms of redistribution, even though the allocated funds are not enough to create any significant effect. Given these results, a new tax-policy is proposed to overcome some of the problems of the present system.

Keywords: microsimulation, inequality, in-kind benefits, higher education, university, tuition fees, subsidy.
JEL classification: C15, D31, H23, H42, H52, I23, I38

1 Introduction

According to the traditional economic categories, higher education cannot be defined as a public good since it is a service that can be excludable and often competing. However, public regulation is still necessary for both efficiency and equity reasons. As far as efficiency is concerned, a non-regulated market for higher education would create problems of certifications, asymmetric information and externalities. Yet, it has become a tradition to invoke equity reasons to justify the pubic intervention in this sector. In general, the problem of financing tertiary education is

closely related to the reasons of public intervention. Indeed, given the nature of human capital investment that characterises higher education, a cost-sharing policy would be economically efficient. More specifically, public funds should pay only for the costs of producing pure public goods (i.e. the cost of producing positive externalities) whilst the other part of expenditure has to be paid by users. Therefore, fees seem as the natural instrument that should be used for this purpose, whilst equity reasons justify levels of fees that can be differentiated according to the economic condition of each user[1].

In this paper we will focus on the distributive effects of such a cost-sharing policy by explicitly taking into account the full set of tax-benefit institutes that characterise the Italian university sector, which are mainly based on fees and scholarships. This kind of analysis is innovative for the Italian case, given the extremely high heterogeneity that characterises the tax-benefit policies adopted in each university and the lack of available microdata.

The most recent paper that analyses the distributive impact of providing tertiary education services is from Sonedda and Turati [2005]. Previous studies are from Citoni [2001] and Brandolini et al. [1998]. All of these papers are based on the Survey on Household Income and Wealth (SHIW) conducted every two years by the Bank of Italy. Given data constraints, these authors base their analysis on the average cost per user. This technique is widespread whenever the aim is the evaluation of services offered by public administrations and there are not substitute markets[2].

Brandolini et al. [1998] and Citoni [2001] use the 1993 survey. They do not consider any financial or in-kind support such as scholarships, free meals, or housing services, while the amount of fees is directly reported in the survey. Sonedda and Turati [2005] base their analysis on 2001 data. They do not consider financial aid or in-kind services either. Moreover, fees are considered as a one-off annual cost represented by the average fee per user paid in each Italian region, a technique that actually does not consider the progressivity of the fee scheme. Nevertheless, given the increasing importance of fees and other financial and in-kind aids, it is becoming important to create more sophisticated simulation models that are able to consider these aspects. Thus, the aim of this paper is to propose a tax-benefit microsimulator that allows taking explicitly into account the spatial heterogeneity of both benefits and fees. In this way, it is possible to evaluate in great detail the distributive impact of the policies adopted by the Italian university institutes.

The paper is structured as follows. In the first section we compare the Italian university policies with others from a selection of European countries. Section two presents the simulation model and compares it with the previous studies. Sections three to five describe the model. Section six presents the distributive analysis. Section seven proposes a tax reform and compares it with the actual system. Section eight concludes.

[1] As it will clarified later, the aforementioned system has been applied in the case of Italy although there are significant differences across European countries.

[2] The most important problem with this approach is that it does not consider the difference between the marginal cost and the marginal benefit due to the inefficiency of public production. Moreover, this approach does not allow to account for differences in quality.

2 Tax-benefit policies for higher education in Europe

The European Union presents a high heterogeneity in the policies for university students. Table 1 contains a summary of the out-of-pocket policies adopted in some European countries:

Table 1. Tuition fees for undergraduate courses. Academic year 2004/2005

Countries	Min fee (€)	Max Fee (€)	Description
England &Wales	0	1670	Varying according to a means test
Ireland	670		Fixed
Denmark	0		
Finland	0		
Sweden	0		
Austria	727		Fixed
Germany	0		+€1000 if out-of-course student
France	150	300	Varying in each university.
Spain	480	850	Varying in each Autonomous Community
Portugal	463	852	Varying in each university
The Netherlands	0	1505	Fixed
Greece	0		+€1400-3000 if out-of-course student
Italy	0	1500	Varying in each university - it depends on a means test

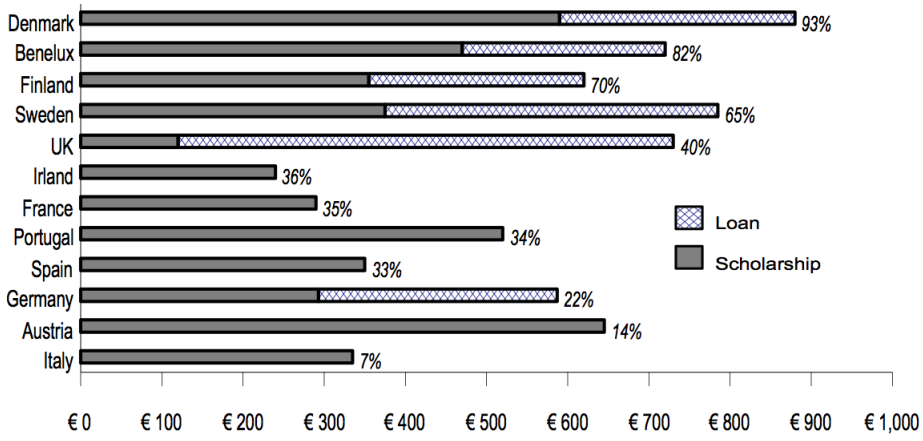
Source: Eurybase, 2005; CHEPS, 2003b; Jongbloed, 2004; Miur, 2005

As it can be seen from the table, cost-sharing policies are widespread in Europe. Apart from the Northern countries, Greece and Germany, all the other countries considered here use some form of cost-sharing policies, although they are not homogeneous. Indeed, some countries adopt a fixed fee defined by the national government (Austria, Ireland and the Netherlands), while others define a maximum fee and allow each university to differentiate that amount.

However, it is worth noting that the system of fees cannot be evaluated without its counterpart, that is the system of financial and in-kind subsidies. The next graph shows the maximum subsidy received in each of the European country considered above. Importantly, we have ordered these countries taking into account another important criterion, i.e. the percentage of students who receive any kind of monetary aid. As the graph shows, among these European countries the most common subsidy is the scholarship for low-income users. The Northern countries offer high subsidies to the majority of students by means of a diversification of the subsidy between loans and scholarships. Italy, among the others, has the lowest percentage of recipients and has also a relatively low import of the monthly scholarship. In general, from the graph below we can also see that the monetary benefits do not differ only according to their type but also (and

significantly) according to their amount.

Graph 1. Maximum monthly subsidy by type and amount plus percentage of recipients



Source: Eurybase [2006]; CHEPS [2003]; Vossensteyn Hans [2004 e 2006], Schwarz S., Reheburh M. [2004]; HIS [2006].

3 The simulation model, general results and comparisons

The simulation model presented in this paper is based on the 2002 survey of the Bank of Italy [SHIW 2002]. Among all the possible available databases, this meets our purposes since it contains information on both the economic condition of the Italian households and the main activity of each individual. Using this latter information along with the variable on the last degree obtained, it is possible to identify the people who are more probably using the university service[3].

We construct our simulation over the more general microsimulation model Mapp02 [Baldini 2004]. The main reason is that Mapp02 contains many tax and benefit simulators that are useful for our policy analysis. In particular, Mapp02 is able to simulate most of the Italian tax-benefit system: all direct and indirect taxes, pensions and most of the monetary benefits. Moreover, Bosi, Baldini and Pacifico [2008] presented an extended version of Mapp02 that is able to take into account most of the in-kind benefits that characterise the Italian welfare state, namely health and education. In this paper we use a definition of *starting* income distribution that takes into account all these possible public instruments but for in-kind benefits. The idea is to consider the full set of possible monetary interventions in order to compute an income distribution as closer as possible to the real one.

[3]This way of identifying the recipients has evident drawbacks since it might append that people who define themselves as *students* do not actually attend lectures or take exams, a phenomenon quite common in Italy. However, it is also probable that who define himself as a student does actually pay the university fees, which is what matters for our distributive analysis.

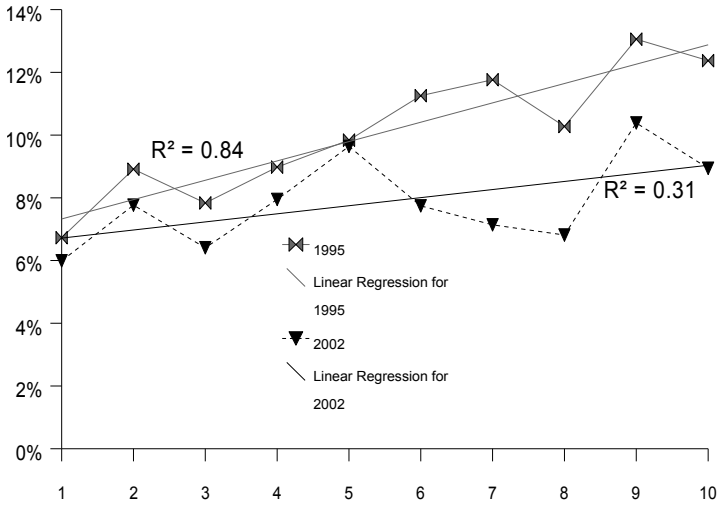
Starting from this income vector, we firstly add the *gross benefit* from higher education, which is computed in terms of the cost of production per user, excluding out-of-pocket revenues and other additional cost that are spent to provide eligible students with subsidies and other monetary and in-kind benefits. This allows us to analyse the changes in the distribution of income when this gross benefit is considered or, from another perspective, to identify winners and losers from the pure distribution of public expenditures in higher education. The analysis will show that the gross benefit reduces income inequality even though the transfer is, on average, pro-rich. When fees and subsidies are considered, the redistributive impact slightly increases although this is due only to the effect of scholarships and other benefits, since the system of fees and other taxes turns out to be regressive.

The evidence provided in this paper can be compared with other Italian studies on the distributive impact of the university sector. We can find differences and similarities. Regarding the similarities, our analysis shows a benefit that is more concentrated on the highest percentiles of the income distribution. However, we do not find such a high correlation between disposable income and benefits from higher education as in Brandolini et al. [1998] or Citoni [2000]. This discrepancy can be attributed to several reasons[4]. In particular, it is plausible that the demand for higher education has changed in a great degree over a decade. In support of this statement, the next graph compares for each decile of equivalent disposable income the percentage of Italian households that more probably demand university services in 2002 and in 1995[5].

[4]Brandolini et al. [1998] find that the Gini index is reduced when higher education benefits are taken into account. Instead, we find that the Gini index slightly increases.

[5]The disposable income is the income after direct taxes, monetary benefits and pensions. We make use of the OCSE equivalence scale.

Graph 2. Percentage of households that demand higher education services for each decile of equivalent disposable income.



Source: Our elaborations based on '95 and '02 SHIW data.

The graph demonstrates that between 1995 and 2002 the distribution of users from different income percentiles has became more equal. However, the graph has to be interpreted carefully. It does not imply that rich households have decreased their demand for higher education, but it rather shows that the distribution of the demand is less concentrated on higher income households. For example, it might be the case that households from the left tail of the income distribution have increased their demand[6].

Another reason that might explain the possible differences between our findings and previous evidence could be related to the equivalence scales. Equivalence scales are necessary in any distributive analysis since they take into account the return to scale produced when more people share part of their fixed costs (bills, rent, etc.). However, the use of equivalence scales significantly modifies the income distribution as they shift *large* households towards its left tail. Moreover, large households are more likely to use educational services, so that the distributive effect of educational services depends in part on the equivalent scale[7]. In their analyses, both Citoni [2000] and Brandolini et al. [1998] are well-aware of this problem. In particular, both papers show that the distributive effect of higher education is lower with respect to other in-kind benefits when these are evaluated without using equivalence scales.

As for the paper of Sonedda and Turati [2005], they present results more in line with our findings and, as we will discuss later, the differences may be due to different simulation techniques.

[6]As Bratti et al. [2008] and Lucifora et al [2008] point out, many universities have increased the number of branches in smaller towns, which have - on average - a lower disposable income.

[7]Baldini et al. [2004] have shown that different equivalent scales change in a different manner the equivalent income distribution.

4 The simulation of gross benefits from attending tertiary education

A well-known problem of the evaluation of goods and services produced outside the market is the impossibility of using prices as a proxy for the evaluation of the willingness to pay (and hence of the utility of consumption). The problem is even more complicated when a parallel market that offers substitute goods and/or representative surveys on the willingness to pay for that particular service does not exist. In this situation, there are few alternatives for the evaluation of the monetary gain.

The most common technique is the evaluation in terms of cost of production per user. Assuming that the public sector is able to produce a particular good with a technology that is closer to the frontier, then it is probable that the marginal production cost is close to the marginal benefit gained by users. Obviously, this is not the case for the public sector, in particular for the academic one. In general, the inefficiency associated with the public production and the absence of competition among public universities are common examples for the failure of this evaluation method.

Nevertheless, we still use this approach in our paper, given the lack of data that would allow the use of different techniques[8]. The data used in the present analysis mostly comes from the National Centre for the Evaluation of the University System, which publishes online assets and liability statements for each Italian public university. Since there is no information about the students who are attending a private university, we used a matching method to recognise those that are more likely to demand a private service and we did not impute any benefit to these matched units[9].

In order to get the gross benefit from higher education, we aggregated to a regional level the 2003 expenditures of each university located in a particular region. Importantly, we isolated the pure teaching expenditures from this total amount using administrative regional data on the percentage of expenditure used for academic research[10].

Once we compute the regional expenditure on didactics we divide this amount by the regional number of students enrolled in the academic year 2002/2003. The result is a good approximation of the average cost per recipient[11]. It is worth noting that we could have multiplied the number of recipients by the percentage of *effective* students since Italy has a high percentage of students who are not on time with their studies or that do not fully attend their degree. This it would

[8] Another reason for our choice is the main aim of our analysis. Indeed, we focus on the effects of the *net* benefit, not the *gross* one. Specifically, what it turns out to be interesting is the effect of instruments like tuition fees and scholarships rather than the effect of the pure public cost per user.

[9] Since less than 6% of Italian students attended a private university in our reference year, results do not change significantly when these students are included among the recipients.

As for the matching procedure, we use the propensity score matching [Rosembaum and Rubin 1984] between the 2002 and the 1993 surveys, as the latter is the only one that contains information on the consumption of public services. Note that the matching has been implemented only among those households that use the service.

[10] The source of data is the government report "Universitá in cifre". The report is available online, see Miur [2005].

[11] Our analysis is focused on undergraduate and graduate students.

have increased the per-capita transfer, but given the impossibility of distinguishing between registered students and effective students we did not adopt this strategy[12]. The amount so obtained is regressed on a set of covariates using a median regression and the predicted values are then imputed to each person who is identified as *potentially* enrolled to the university[13].

Importantly, the benefit obtained with this procedure has to be seen as a *gross* transfer. Indeed, enrolment and tuition fees partially finance this benefit and, at the same time, it does not consider expenditures to produce in-kind services and/or to provide financial aids to students. Once these components are considered, we can define the corresponding benefit as a *net* benefit.

Unfortunately, evaluating fees and benefits is complicated for many reasons. One reason is the lack of available data that is necessary to better reproduce tax and subsidy functions. Hence, assumptions and conjectures have to be made to simulate these instruments. Another important reason is the high autonomy that the national law recognises to each single institute in the determination of subsidies and fees. As an example, the national rules for the tuition fees are very general. Hence, year-by-year, each university has developed its own system that makes it difficult to understand a common underlying process[14]. This situation implies that, in order to adequately reproduce the distribution of fees and subsidies to academics, each single university has to be analysed separately. The next section presents an overview of the simulator for both tuition fees and various subsidies that is able to capture most of this heterogeneity.

5 The criteria for the simulation of tuition fees and subsidies

Unfortunately, it is not easy to determine the university in which each student is enrolled from the Bank of Italy database. Given the high heterogeneity among universities in the definition of fees and subsidies, this lack of data is particularly binding.

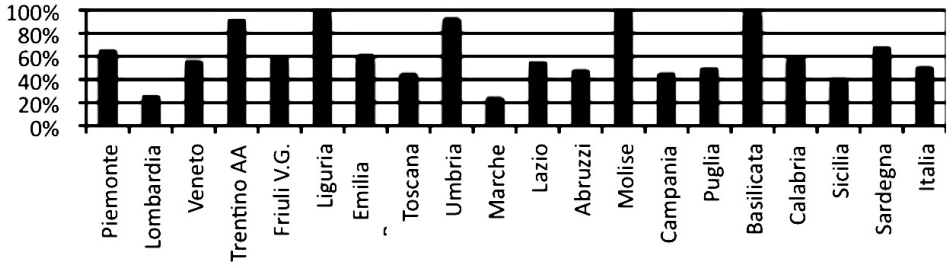
As anticipated in the previous section, we assume that students who reside in a particular region attend an institute located in the same region. Moreover, since there are often several universities in the same region, we further assume that the student attends the biggest one. The extent of this set of assumptions has to be considered properly since it might not be as strong as it can be initially thought. Firstly, the universities we dealt with cover more than half of the whole population of students. Secondly, we have noticed that the smaller universities of a particular region tend to imitate the policies of the biggest ones. The graph below shows - for each Italian region - the share of students enrolled in the universities we consider with respect to the total number of students enrolled in the same region:

[12] See the book "L'Universitá truccata", Perotti [2008].

[13] It is worth noting that this approach considers neither the differences in quality, nor the phenomenon of the regional mobility. However, the problem of regional mobility in 2002/2003 is not a great limitation, as the percentage of students who attend a degree in a region other than the one of residence is less than 6%. Aggregated data on student mobility can be found online, see www.cnvsu.it for details. The results of the quantile regressions can be found in the appendix.

[14] For the tuition fees the level of heterogeneity is surprisingly high. Each university has different indicators for the household economic condition, different numbers of brackets, different marginal taxes, different criteria to evaluate the students' merit, etc.

Graph 3. Percentage of students enrolled in the considered university with respect the whole population of student enrolled in the same region.



Source: Own elaboration on administrative data.

As it can be seen, the error made with our assumptions is lowest in smaller regions and/or in regions with a "dominant" university. However, the error increases in highly populated regions and/or in regions with competitive universities. The table below contains the universities we are considering for each region and the relative number of students:

Table 3. Considered Universities and number of students – Academic year 2002/2003.

Region	University	Students
Piemonte	Torino	60,741
Lombardia	Milano	61,115
Veneto	Padova	57,848
Trentino AA	Trento	14,510
Friuli V.G.	Trieste	23,953
Liguria	Genova	34,523
Emilia Romagna	Bologna	101,.006
Toscana	Florence	59,458
Umbria	Perugia	33,336
Marche	Ancona "Università Politecnica delle Marche"	14,450
Lazio	Rome - "La Sapienza"	132,537
Abruzzi	Chieti – "Gabriele D'Annunzio"	23,617
Molise	Campobasso	9,068
Campania	Napoli - "Federico II"	94,278
Puglia	Bari	50,140
Basilicata	Potenza	7,081
Calabria	Arcavacata di Rende	29,193
Sicilia	Palermo	62,262
Sardegna	Cagliari	33,621

Source: Own elaboration on MIUR data.

The simulation of the university fees has been done by analysing the relative local law for each of the universities listed above. In what follows we summurise the general procedure and the main assumptions we made to reproduce the local system of fees and subsidies.

To start with, it can be useful to put the stress on the common parameters that enter in the fee functions. The two most important criteria are the household economic condition and its number of members. These two elements explain most of the variations in the amount of fees due. However, these factors are not unique. Each university has set its own criteria to define the household economic condition and the way to take into account the number of people in the same household. This has made the simulation cumbersome since we had to reproduce many indicators for both[15].

However, there are several other elements that enter the fee functions. For instance, the student performance, the type of course, the department attended, the full-time/part-time condition and whether the student is on time with his/her studies. Unfortunately, most of this information is not in our database. Hence, we had to proceed using a set of assumptions and a system of weights to consider all these aspects[16]. Nonetheless, it is worth stressing out that these parameters are not so important in the simulation of the fee schemes. Indeed, none of the universities above uses all of these parameters together. For instance, one university could take particularly into account the students' performance and another one the type of department attended, but it is unusual that the same university uses both simultaneously. Moreover, none of these additional parameters adds so much variation to the amount due[17]. In fact, what makes the difference in the specific academic year considered in this paper are the indicator of the economic condition and the scale of equivalence adopted. Fortunately, we have full control of these variables and we could carefully reproduce the fees-functions applied in each of the 19 universities considered.

The simulation for the scholarships has been easier than the one for the fees. The reason is an *ad-hoc* national law for their regulation[18]. The national law defines three criteria in order to be eligible for a scholarship: the economic situation, the performance and the distance to the university. Conditional on these parameters, the Italian law defines the minimum value for the scholarship amount. Once again, we do not have information on both the student location and his/her performance. To take into account the student location we made use of a system of weights derived from administrative data on the number of students who live far from the university[19]. In order to account for the students' performance, we took into account all the

[15]The most common indicator is the ISEU (Indicatore della situazione economica per gli universitari). The ISEU takes into account both the household income and its wealth. The other indicators we find can be seen as different versions (or precursors) of the ISEU. For a full description of the ISE and the ISEU the interested reader can read the paper "Quinto rapporto sullo stato di attuazione e sugli effetti derivanti dall'applicazione dell'indicatore della situazione economica" [2004].

[16]Most of the data used for the construction of the weights is from the CNVSU. The author is available for further clarifications about the procedure used for each single university.

[17]For example, having a delay in the graduation adds a very small penalty in the fees due when this parameter is considered.

[18]See the d.p.c.m. 09-04-2001.

[19]The system of weights is different for each region. The source of data is the "Osservatorio Regionale per il Diritto allo studio del Piemonte".

possible information available in the database that could help predict it. In particular, we used the high school final examination mark and the number of years elapsing from the high school graduation. Finally, in the simulation of scholarships we also considered the fact that in Italy there is an increasing number of students who are eligible for a scholarship but that do not receive it due to the lack of funds.

Given all these information, the distribution of scholarships is obtained through a minimum distance algorithm that reproduces - for each region - the joint distribution of eligible students and of eligible students who are without a scholarship[20]. Finally, it is worth noting that some universities provide part of the scholarship in terms of in-kind benefits. When this happens, we add an estimate of the monetary value of the average in-kind transfer to the monetary part of the scholarship[21].

6 Simulation results

Before proceeding with the distributive analysis, it is worth making some comparisons between the prediction of the simulator and the real data. In this exercise, we particularly focus on the tuition fees and monetary benefits for the academic year 2005/2006[22]. To start with, in 2005 the revenues from tuition and enrolment fees have been about 1.25 billion euros[23]. The simulator produces revenues for about 1.29 billion euros, a value very close to the real one. Moreover, as shown in the next graph, the distribution of students for each bracket of per-capita amount of fees paid is definitely close to the simulated one:

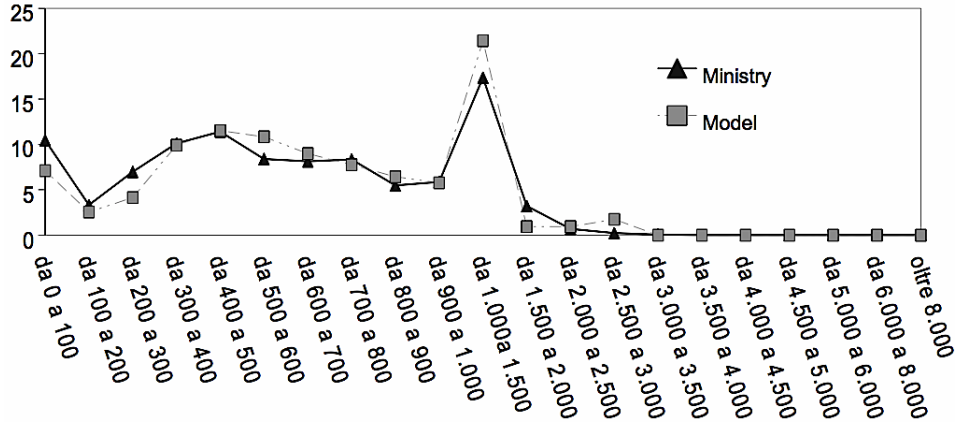
[20]The joint distribution for each region is available online at the website of the institute "Osservatorio Regionale per il Diritto allo studio del Piemonte".

[21]To evaluate the monetary value of the in-kind benefits we used an *ad-hoc* study about the cost of refectories: "I costi di gestione del servizio di ristorazione: esperienze a confronto" Russo M. [2005]. For the housing services we used the monetary value recognised to students who did not find a place in the house of residence as a proxy for the cost of providing a place in a residence. Most of the time, is the university itself that publishes online both the scholarship amounts (with and without the in-kind benefit).

[22]The year of the analysis is the 2005. We did not consider the budget data of the academic year 2002/2003 because the simulation of fees and benefits has been based on the 2005/2006 rules (the only one which was fully available online at the time we made the analysis). Thus, any monetary value of Mapp02 has been converted in 2005 values using ISTAT weights. As long as the demand for higher education has not changed significantly between the 2003 and the 2005, the latter is the right year to validate the prediction of our simulator.

[23]Source: The Ministry of University, MIUR – Internal Bureau of Statistic [2006]. The amount does not consider revenues from the so-called "tax for the right of studying" ("tassa per il diritto allo studio") and considers fees paid only by students from undergraduate and graduate degrees.

Figure 5. Distribution of student conditional on the per-capita contribution. Comparison between predicted and observed value.



Source: MIUR data and own elaboration on SHIW data.

Unfortunately, these kinds of comparisons are the only ones that can be made given the scarcity of administrative data about university fees. For the simulation of the scholarships we found a correlation of 0.8 with the variable that collects data on this type of earnings. Moreover, thanks to the algorithm used in the computation of this distribution, the predicted data reproduces well the distribution of eligible students and of those eligible students who are without a scholarship. This clearly confirms the success in the reproduction of the scholarship functions[24].

7 The distributive analysis of the Italian university system

The starting point of the analysis is an income distribution that takes into account monetary benefits (unemployment benefits, maternity credits and other form of subsidies), pensions, direct taxes and most of the indirect taxes. This is defined as the real disposable income. Starting from this income distribution, we precede by adding one by one the components of the higher education benefit. We first add the gross benefit, followed by the fees and finally the subsidies. We analyse in detail the absolute variation of the Gini index – the Reynolds-Smolensky index – using its decomposition into the three typical components of incidence, progressivity and re-ranking. The incidence part measures how much the instrument, i.e. the gross transfer, the fees, the subsidies or the net transfer, is a burden to the starting definition of income (the ex-ante distribution). The progressivity part measures the concentration of the instrument with respect to the poorest percentiles of the starting definition of income. Finally, the re-ranking component isolates the effect of possible repositioning of units with respect to the starting sorting. The two groups of interest are the whole Italian population and the sub-sample that actually demand

[24]We do not have enough information to evaluate the simulation results for other in-kind transfers such as free meals and housing services.

higher education services. The unit of analysis is the household. The OECD scale of equivalence is applied to the disposable household income in order to take into account possible returns to scale.

The following table shows the distributive impact of the University public sector with respect to the equivalent disposable income for the whole Italian population:

Table 4. The distributive effect of attending a post-secondary degree in a public University

Variabile	Gini	RS	RS decomposition(*100)			Conc.
Equivalent disposable income (y)	37261		Inc.	Prog.	Rer.	
y + gross benefit	37079	-0,18	+0,71	-29,67	0,03	7,59
y - fees and taxes	37277	+0,02	-0,2	-8,6	0,0	28,6
y + subsidies	37215	-0,05	+0,1	-95,9	0,0	-58,6
y + net benefit	37041	-0,22	+0,60	-41,08	0,02	-3,82

Source: own elaboration on SHIW data, whole Italian population

As results show, the inequality in the equivalent disposable income corresponds to a Gini value of 37.26. A reduction of -0.18 in the Gini index is observed once the gross university benefit is considered. Finally, if we consider also the fees and subsidies, we observe that the former have a small regressive impact while the latter are slightly progressive. Considering the whole (net) benefit from higher education, we observe a reduction of 0.22 in the inequality. As it can be seen from the last column, the concentration index of the gross benefit is slightly positive indicating a pro-rich transfer. Nevertheless, contrary to Brandolini et al. [1998], the benefit is still slightly redistributive[25].

The next table shows the results for the sub-sample of households that actually demand the service:

Table 5. The distributive effect of attending a post-secondary degree in a public University.

Variabile	Gini	RS	RS decomposition(*100)			Conc.
Equivalent disposable income (y)	36377		Inc.	Prog.	Rer.	
y + gross benefit	34536	-1,8	+6,1	-30,8	0,0	+5,6
y - fees and taxes	36511	+0,9	-1,5	-8,7	0,0	27,7
y + subsidies	35943	-0,4	+0,5	-98,0	0,0	-61,6
y + net benefit	34225	-2,15	+5,2	-42,3	0,1	-6,0

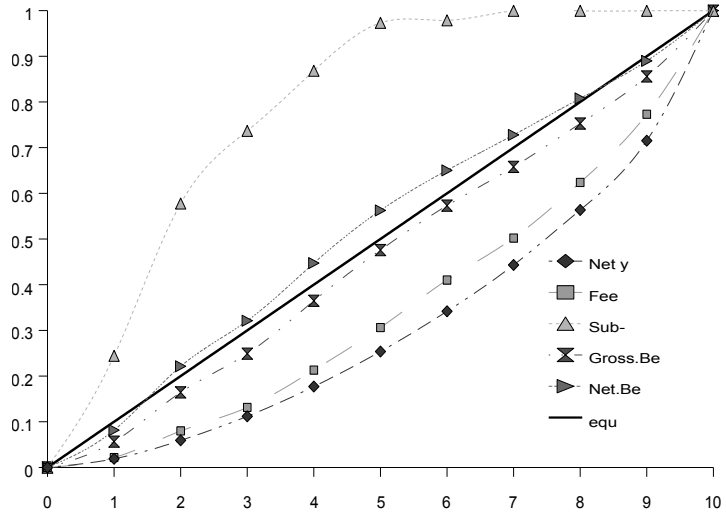
Source: own elaboration on SHIW data, sub-sample of recipients.

As it was expected, the results are similar to those reported for the Italian population, although enlarged[26]. A better understanding of these results can be made by means of the following concentration and Lorenz curves:

[25] We highlighted the possible reasons for this difference in the results in the introduction.

[26] Given that the concentration index of the gross benefit in table 5 is positive but close to zero, the transfer is substantially well-distributed across the various percentiles. Hence, the results for the sub-sample of user should not change significantly but in magnitude.

Figure 6. Concentration curves and Lorenz curve of the equivalent disposable income.



Source: Own elaboration on SHIW data.

Figure 6 shows the concentration curves of the gross benefit, fees, subsidies and net benefit. The Lorenz curve of the disposable income is also displayed (the starting income distribution). The gross benefit has a concentration curve that is under the 45 degrees line, which indicates a pro-rich benefit. Nevertheless, this curve is close to the 45 degrees line indicating a substantially well-distributed transfer[27]. The small regressive impact of the tuition fees is represented by the dominance of the fees concentration curve with respect the disposable income Lorenz curve (the Jakobsson-Fellman-Kakwani theorem). The high progressivity of subsidies is instead proved by the concavity of the their concentration curve. When subsidies and fees are considered, the net benefit becomes slightly pro-poor. It is worth noting that the "middle class" is the one that gains the most from the actual system of subsidies and benefits.

Regarding the Reynolds-Smolensky decomposition for the sub-sample of households that use the service (table 5), it is worth noting that the re-ranking measures are almost zero. Thus, we can focus on the two measures of progressivity and incidence without misunderstandings[28]. The progressivity measure – the Kakwani index – of the gross benefit is just 30.8%. To produce a reduction in the Gini index of almost 2 points we then have to look at the incidence that

[27]This information is summarised by a slightly positive concentration index.

[28]The Reynolds-Smolensky index is defined as follows:

$$\begin{aligned} RS = G_y - G_{y-t} &= \tfrac{a}{1-a}(C_t - G_y) - (G_{y-t} - C_{y-t}) \\ &= \tfrac{1}{1-a}(Kakwani) - (reranking) \end{aligned}$$

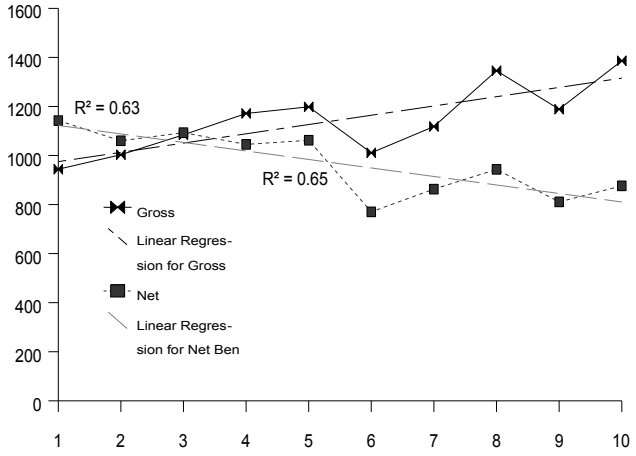
Hence, the incidence factor (with a<0 for taxes and a>0 for subsidies) multiplies the progressivity factor (negative or positive) so that the sign is always defined by the progressivity measure (the Kakwani index) whenever the re-ranking is zero.

is relatively high (+6.1). This result is important because it is a property of every in-kind benefit with universalistic features. Indeed, as in our case, the gross benefit is substantially well-distributed among the various percentiles. Hence, any possible redistributive effect has to be imputed to the incidence with respect to the income[29].

As regards to the effect of subsidies, we notice that the progressivity is close to 100%. Nevertheless, their redistributive impact is very low and the reason can be found in their almost negligible incidence. Fees and other taxes have a small regressive impact driven by the progressivity factor (which is negative). Overall, the net benefit is slightly more redistributive than the gross one.

The figure below, which presents the average net and gross benefit for each percentile of equivalent disposable income, helps to better understand the differences between them and, therefore, the effect of taxes and subsidies:

Figure 7. Monetary value before and after fees and subsidies to students for each decile of equivalent income.



Source: own elaboration on SHIW data, sub-sample of users

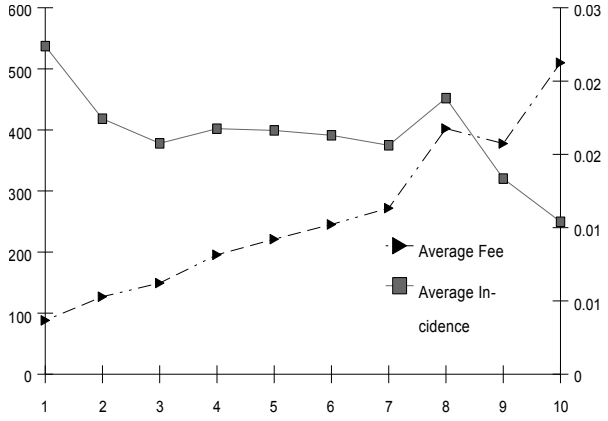
On average, the gross benefit increases with disposable income so that the relationship between income and benefit is clearly positive. Once the subsidies and fees are considered, a rotation around the third decile is observed. In other words, the first two deciles are net winners thanks to the joint action of (relatively) low fees and high subsidies, while, with the increase of income, those deciles after the third witness a progressive loss. It is important to stress that the position of the middle class (third-fifth deciles) is essentially unchanged after the action of subsidies and taxes. This means that the middle class is the *real* winner, as it gains from the subsidies while

[29]Hence, theoretically, it would be enough raising the expenditures for this service to increase its distributive impact. The reason of this phenomenon lays in the (substantial) independence between income and benefit, which is actually driven by the universalistic feature of the service. In other words, a universalistic benefit implies the same money transferred to low-income and wealthy people. This leads to a redistributive effect since the incidence of a given sum of money on low incomes is higher than the incidence on high incomes.

slightly losing in taxes so that it eventually has a pure gain from the gross benefit.

Importantly, for the first two deciles to be the winners, a more progressive system of fees is needed. Indeed, even though people in the first two deciles gain from the system of subsidies, the regressivity of fees makes them net losers. This point can be better explored by means of the following graph, which shows - for each decile of equivalent income - the average fee in the left hand side axis and the average incidence in the right hand side axis:

Figure 8. Average amount and incidence of fees for each decile of equivalent income



Source: Own elaboration on SHIW data

As it can be seen, while the average tax is increasing with higher income, its average incidence is decreasing. In other words, the fees grow at a smaller rate with respect to the growth rate of income, producing the regressivity we observe in the data. This can depend on several factors. Firstly, even though fees are structured as a function of income, they always contain a fixed element (which corresponds to the enrolment fee, other administrative fees and the "tax for the right of studying"). Secondly, the income distribution of the households that demand the university services, is only partially known to the university administration[30]. Finally, it might be that universities want to keep the maximum fee relatively low.

8 A new system of fees

University fees are relatively recent for the Italian university system. They have been introduced in the 1993 as a flat rate fee. In 1997 a new legal measure stated that fees could vary among universities and even among courses and faculties within the same university[31]. The same law also stated that the new system of fees has to respect two fundamental criteria; the overall

[30]The Italian law makes it difficult for a university to verify the reliability of the income statements presented by students.

[31]See, d.p.r. 25 luglio 1997, art. 2 comma 1 e 2; art. 3 comma 1; art. 5 comma 1.

equality and the maximum amount of fees that students has to pay. In particular, the new rules stated that the fees have to be progressive and defined according to the users' economic condition. Moreover, the revenues from the fees cannot exceed the 20% of the FFO transfer. The aim of these constraints is clearly to avoid fees set too high and to guarantee a system of payment that is overall proportionate.

There can be several reasons to propose a new system of fees for the Italian university system. After the 1997 law, each university has adopted its own system of fees and has exploit new strategies to obtain more funds from the students[32]. As a result, fees have been progressively rising in a very university-specific manner, which reduces the possibility of monitoring the dynamics of the whole system. Moreover, as we have seen in the previous analysis, since universities do not know the complete distribution of income of the users and do not want to set too high marginal taxes, the overall tax-policy of each university may create an unequal system at the aggregate level.

For these reasons might be important to re-define the rules for the university fees in order to achieve the progressivity requested by the Italian law and to produce a more homogeneous and fair system of payment.

Here we propose a fees function that is unique all over the Italian public universities. We define a flat-rate tax with a marginal tax of 3.8% and a deduction of €8000. If there are more students in the same household, another deduction of €1000 for each student other than the first is applied. The maximum payable amount is €5000. The economic condition is computed using the ISEE. The actual tax for the right of studying is added to the so computed fee. Importantly, the marginal tax has been defined in order to produce the observed amount of actual revenues.

The next table compares the proposed system of fees with the actual system:

Table 6. The distributive effect of the fees system (recipient sub-sample).

Variabile	Gini	RS	RS decomposition(*100)			Conc.
Equivalent disposable income (y)	36.38		Inc.	Prog.	Rer.	
y - fees and taxes	36.51	+0,9	-1,5	-8,7	0,0	27,7
y - proposed fees and taxes	36.14	-0,23	-1,5	16,2	0,0	52,6

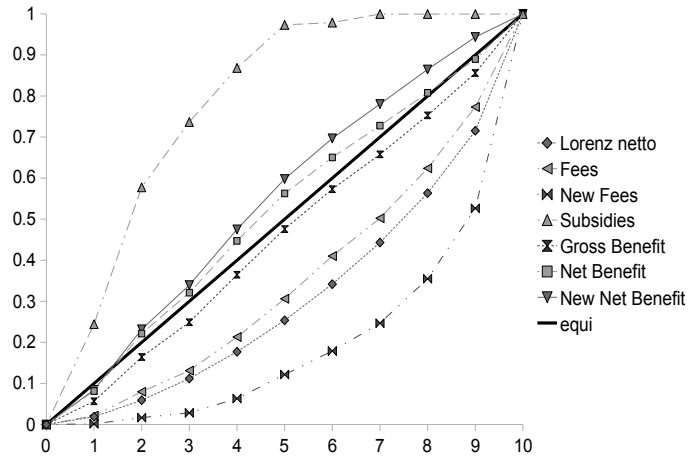
Source: Own elaboration on SHIW data

As results show, the proposed system is now redistributive, decreasing the Gini index of 0.23. The decomposition of the global redistributive effect shows that the only difference between the two systems lays with the progressivity component. This result was expected, since the marginal tax has been adjusted in order to produce the same volume of revenues. Importantly, if we focus on the concentration index it can be seen that most of the revenues now come from the richest deciles. The next graph shows the concentration curves of the various components of the university transfer. The *new* net-transfer concentration curve - defined according to the proposed fees system - lays over the previous one, meaning that the overall benefit is now more

[32] An example is the "contributo di facolta"', a fee whose amount depends on the specific department.

progressive[33].

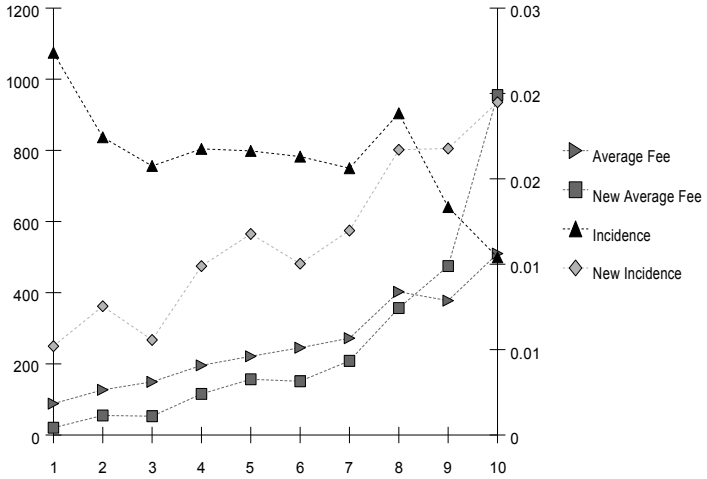
Figure 9. Concentration curves and Lorenz curve of the equivalent disposable income.



Source: Own elaboration on SHIW data.

The next graph allows a deeper comparison between the actual system and the proposed one. The left and the right vertical axis measure the average fee and the incidence of fees for each decile of net income respectively:

Figure 10. Average amount and incidence of fees for each deciles of equivalent income.



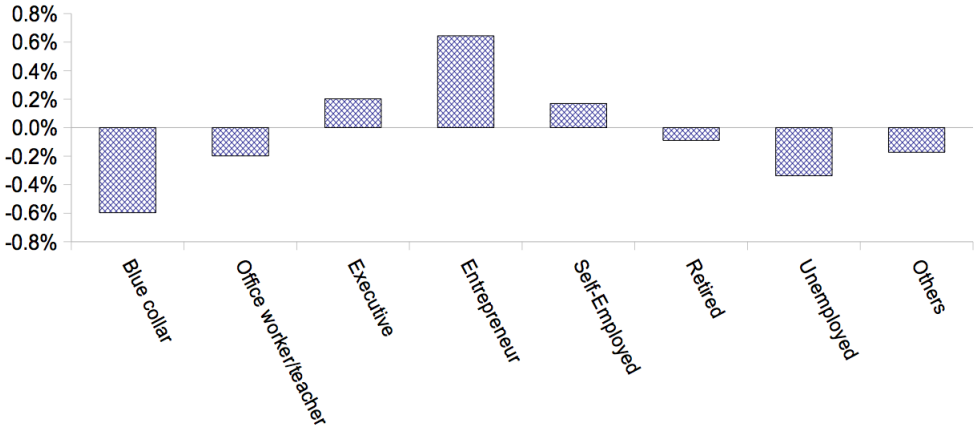
Source: Own elaboration on SHIW data, recipients sub-sample.

[33]The new fees concentration curve is now under the Lorenz curve of the net income. According to the Jakobsson-Fellman-Kakwani theorem this guarantee a progressive system of fees.

As it can be seen, the average fee is increasing for both systems. Nevertheless, the average fee in the proposed system is on average lower than the actual one up to the eight decile. For the 9th and 10th deciles the new average fee is significantly higher. In particular, the last decile is the one that has the highest increment, the average fee going from €500 to €950. Moreover - differently from the present situation - the average incidence in each decile is increasing. This indicates that the new tax lays heavier on richer households.

The next graph shows the variation in the average incidence according to the main activity of the householder:

Figure 11. Variation of the average incidence once the new system is applied.



Source: Own elaboration on SHIW data, recipients sub-sample.

As it can be seen, the average incidence increases more for households where the householder is self-employed, an executive or an entrepreneur. The real net winners from the proposed system of fees are students from households where the householder is either unemployed, a blue collar worker, a teacher or an office worker.

9 Conclusions

This paper has presented a microsimulation model for the university sector that is able to account for the distributive effects of subsidies and tuition fees. Simple tests have shown that the model is able to well reproduce the observed distribution of fees and subsidies, even though the lack of data needed to reproduce the subsidy and the fees functions put hurdles on the construction of the simulators, requiring the definition of assumptions when the information was not available.

The distributive analysis has shown that higher education services have a small redistributive effect, which mainly depends on the incidence component rather than on its progressivity. This means that the higher education benefit is well-distributed across the whole population instead of being focused only on wealthy households.

Subsidies for scholarships and other services for low-income students are significantly progressive although the funds they receive are not enough to produce any real effect. Fees and other taxes seem to have a slightly regressive impact since they grow at a smaller rate with respect to the growth of disposable income.

A new system of fees is proposed to overcome the regressive impact of the present system. The new fee function is based on a flat rate scheme and a system of deductions. The new system is now progressive and reduces the fee burden for low-income households. Much work has to be done to truly understand the distributive impact of fees, scholarships and of the distribution of the public expenditures for higher education. Future works could introduce behavioural reactions so as to simulate how students react when the university tax-benefit system is changed.

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Appendix

Results from median regression:

Number of obs =	803			
Pseudo R2 =	0.6			
unitras	Coef.	Std Err.	T	P>t
Nord	14.71	1.87	7.85	0.00
Nord-Est	9.46	1.92	4.94	0.00
Middle	-3.01	1.77	-1.71	0.09
Sud	-9.96	1.71	-5.84	0.00
Nstud=2	54.43	1.14	47.97	0.00
Nstud=3	91	3.16	28.83	0.00
ise2	-0.79	1.38	-0.57	0.57
ise3	-1.77	1.94	-0.91	0.36
ise4	3.99	2.3	1.73	0.08
ise5	6.57	2.65	2.48	0.01
ise6	-9.88	3.76	-2.63	0.01
ise7	3.41	3.78	0.9	0.37
ise8	-4.68	4.38	-1.07	0.29
ise9	6.9	4.58	1.51	0.13
ise10	2.65	3.14	0.84	0.40
sex	1.84	1.01	1.82	0.07
Age	-0.47	0.2	-2.36	0.02
MarkHS	0.1	4.17	0.02	0.98
YearHS	-0.39	0.22	-1.74	0.08
liceo	0.23	1.06	0.22	0.83
_cons	841	446.1	1.89	0.06

Note: dependent variable divided by 1000; MarkHS=high school final examination mark; YearHS=year of High School graduation; Liceo=1 if High school was a liceo; Ise1..Ise10 are dummies for the class of Income; Nord, Nord-est, Middle and Sud are dummies for the area of residence; Nstud=2 and Nstud=3 are dummies for the number of students who attend a university degree.