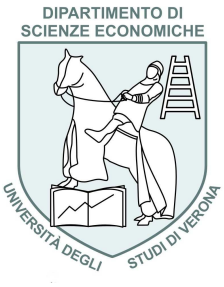

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A Method to Measure Standard Costs of Juvenile Justice Systems: the example of Italy

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Abstract: This study proposes a standard costs method to evaluate the total direct costs of a juvenile justice system and applies it to the Italian case.

Keywords: Juvenile justice, standard cost, simulation.

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1. Introduction

During times of economic recession and social suffering, basic services to protect children are at risk. Essential health, education and welfare services have worsened during the crisis. Children are especially vulnerable to public expenditure cuts (Jenkins et al. 2013, Lundberg and Wuermli 2012, Ruxton 2012).

Youth justice systems are also exposed to increasingly stringent budgets and economic stagnation because the service is partly provided by the public and partly by the private. The Italian system is no exception. The public component managed by the State accounts for 54% of total expenses, while 46% is managed by communities that are private non-profit organizations either in partnership with the State or with local public companies. In the last decade, the average number of young offenders under custody every year in communities has tripled from about 300 in 2001 to about 950 in 2012 where about 30% are foreigners (Department of Juvenile Justice (DJJ)). Interestingly, the number of young people under custody for the first time were in year 2007 53% of the total, while in year 2012 they reduced to 38%, thus signaling that a larger number of young people in conflict with the law spends more time within the penal system mainly because of a significant change in the types of crime committed by the juvenile offenders. This aspect substantially affects the costs of the penal system.

Because of fiscal consolidation and austerity policies, the Italian government is late on payments to the non-profit private sector that has limited possibilities to cover losses resorting to private savings. The central government has also been freezing wages and the hiring of new staff also in the social sector causing a reduction in both quantity and quality of youth justice services provided by the public and community non-governmental organizations. The sustainability of the public/private partnership of juvenile justice is jeopardized.

The relationships between the economic crisis, increasing material and relational poverty and juvenile crime are very strict (Perali 2014, WHO 2010, ECJJ 2012, IJJO 2013, Levitt and Lochner 2001). In the Italian data a robust relation is apparent from inspection of Graph 1 (panel a and b). The number of young offenders that formally entered the justice system in 2007, at the beginning of the great recession, was about 14000 (including those denounced on the loose) and increased to more than 20000 in 2012.[1] Higher crime means higher costs and with less public resources means a higher proportion of children left-behind that will have hard time to catch back and will lower the security perception within the community (de Blasio and Menon 2013).

Undertaking an evaluation of the cost, efficiency and effectiveness of the Italian youth justice system is a difficult task due to the lack of reliable and robust data. Data collection, monitoring and evaluation and research are key to achieving evidence-based policies aiming at making the service more efficient and cost effective and to measure improvements we make for our children incurring problems with the law. In times of economic restraint when resources are scarce, it is fundamental to surgically intervene in the most inefficient and weak points of the system in order to improve overall

[1] In 2010 about 18% of the young offenders under custody were foreigners and about 10% were female. About 60% of all young offenders under custody is found in the South and Islands (DMG official data). Foreigners under custody are more frequent in the North and Center of Italy where the proportion is around 30% due to the higher concentration of ethnic groups attracted by higher job-opportunities. There are also significant regional differences. For example, in Sicily the number of young offenders under custody is about 19% of the total population under custody, twice as many as those in the Triveneto macro-area composed by the regions of Veneto, Friuli-Venezia-Giulia and Trentino-Alto Adige. In Sicily, only 8% are foreigners as compared to 27% in the Triveneto macro-area. This evidence about the size of juvenile crime in Sicily does not imply that Sicily's socio-economic environment is more criminogenic as compared to other regions of Italy. For example, in Sicily police forces are about twice the magnitude of police forces in any region of the North of Italy.

efficiency in the short term while ensuring a sufficient level of the service.

Greater efficiency, that is spending less money to achieve same outcomes for all our children, and effectiveness, that is improving children's outcomes and opportunities in an appreciable way, ensure that the State provides value for money to the taxpayer (Aos *et al.* 2001). Leaving a young member of our society behind is both a private and a social cost that cumulates into the future that is difficult to predict and, therefore, to actualize.

In general, effective prevention reduces the chances that a child at risk of being in conflict with the law gets arrested. Prevention of any form of social exclusion that may be responsible of an offense is more desirable than a cure aiming at reintegrating in society a child involved in an offense. It is an investment in the future, not a cost. Diversion is a viable option to avoid that a child moves further in the criminal justice system by undergoing a trial thus increasing the risk of becoming more damaged and costing society more money. Before executing a sentence a judge may propose a bail. A sentence may envision a community sanction or may call for a detention period (Kilkelly 2011)[2].

Detention is often the most expensive youth justice service and potentially harmful for children because they may be more likely to commit offences again and more difficult to reintegrate them providing the same opportunities enjoyed by the other young people to attain a comparable standard of living. On the other hand, diverting young offenders and resorting to community sanction significantly affect the quality of reintegration, recidivism, and system's costs (Holman and Ziedenbuerg 2006).

Fostering diversion from formal prosecution is both in the best interest of the children, especially in those cases where criminal records are expunged, and their families and an effective means to improve efficiency by reducing the number of children going through the court bottlenecks. It also provides a more equitable access to justice whose costs can often be discriminatory. The court process is the most lengthy and expensive component of the juvenile justice system. It should be used strictly for cases threatening a serious damage to society. To ensure effective educational and re-inclusive action, children should be tried avoiding undue delay. Victims as well deserve rapid court proceedings.

In Europe, about 80% of children who commit an offence, do not re-offend. In the 2010 sample of young offenders collected in the Triveneto and Sicily regions of Italy (Perali 2014), about 34% were offending for the second time. This higher than average data is not surprising during times of economic and social crisis. For petty or minor offences, it is still reasonable to believe that a verbal warning, family involvement, or a mediation program within a restorative justice framework prevents children from unnecessary criminalization and stigmatization, cares about their educational career, does not separate them from their family and is often sufficient to deter them from offending again.

For children who commit an offence deserving a court sanction, a community sanction such as counseling, probation (ex art. 28 DPR n.448/88), vocational training and work, or mediation, rather than a penal sanction in isolation, is highly preferable. Children have greater opportunities for social reintegration and to make reparations to their communities for the external damage they caused (Barton and Butts 1990, Henggeler *et al.* 1998).

The main objective of the present study is the quantification, rather than qualification, of the costs

[2] Currently, the Juvenile Justice System is regulated by the DPR no.448/1998 (*Approvazione delle disposizioni sul processo penale a carico di imputati minorenni*) and the DLgs no.272/1989 (*Norme di attuazione, di coordinamento e transitorie del decreto del Presidente della Repubblica 22 settembre 1998, n. 448, recante disposizioni sul processo penale a carico di imputati minorenni*).

associated with each component of the youth justice system and the overall system evaluation in order to provide the government with reliable information to improve the efficiency and the effectiveness of the system. This spending review can generate important savings that can be crucial in guaranteeing the sustainability of the system and the quality of the services offered.

In Italy there does not exist a structured cost evaluation of the youth justice system. We propose a cost evaluation method similar to the cost standard method adopted for the evaluation of the health sector and use it to provide a statistically robust estimate starting from minimal information. The method can be adopted also by other States where the monitoring of the costs of the juvenile justice system is of poor quality. We also compare the estimated costs with an estimate of the benefits stemming from the justice system as deduced from the families' willingness to pay for social rehabilitation programs. The comparison shows that the resources to sustain and improve the system may come from efficiency savings and volunteer contribution from local communities that still reveal a high propensity to invest in the future of their troubled children even in times of economic recession.

The study is organized as follows. The next section describes the structure of the Italian juvenile justice system. Section 3 describes the proposed standard cost method, the data and simulation technique, while section 4 defines the eight care packages used in the analysis. Results are presented in section 5 and are followed by conclusions and policy considerations.

2. The Structure of the Italian Juvenile Justice System

To understand the cost structure of the Italian Juvenile Justice System (IJJS) we summarize here the main features of the operational and organizational architecture of the services for the minors in conflict with the law. As illustrated in Figure 1, when a child is arrested enters the penal structure formed by the First Reception Shelters (Centri di Prima Accoglienza - CPA), the Juvenile Social Service Offices (Ufficio di Servizio Sociale per i Minorenni - USSM), the Juvenile Penal Institute (Istituto Penale per i Minorenni - IPM) and the Community regulated by the instituting legislative decree emanated on July 28 1989, No. 272 (Bargagli, Colombo and Savona 2003).

All services offered by the juvenile justice system are coordinated by the Department for Youth Justice that is one of the four departments of the Justice Ministry. The Department is articulated in 12 territorial centers (Bari, Bologna, Cagliari, Catanzaro, Firenze, L'Aquila, Milano, Napoli, Palermo, Roma, Torino, Venezia), 27 First Reception Shelters, 19 Juvenile Penal Institutes, 29 Juvenile Social Service Offices located in the Court of Appeal districts [3], 11 Ministerial Communities and a range of communities of the private social that collaborate with the different territorial Center of Juvenile Justice (CGM).

First Reception Shelter (CPA)

The CPA is the service in charge of hosting minors that have been arrested or taken under custody offering hospitality until the validation hearing from the pretrial investigation judge (GIP), that must take place within 96 hours from arrest. The CPA, while ensuring the custody of the child, is not characterized as a service detention. Not all young offenders under custody pass through the CPA. Offenders who are convicted with or without pretrial are traditionally received in CPAs.

[3] In Sicily, there are four courts and associated USSM in Palermo, Messina, Catania and Caltanissetta, as many as there are in the three regions located in the North East of Italy, that is Veneto, Friuli Venezia-Giulia, and Trentino Alto Adige, in Venezia, Trieste, Bolzano and Trento.

Juvenile Social Service Offices (USSM)

These structures have been initially established in 1934 with the Royal Decree (R.D.) No. 1404 with the mission of rehabilitating the minors with an irregular conduct or personality, curing and preventive juvenile delinquency. The Legislative Decree 1985 of 1962 institutes that the Social Service Offices be located in each Court of Appeal district and assign them also the task of undertaking studies and sociological surveys pertaining the prevention of juvenile delinquency. In the 1988 reform (D.P.R. 448/1988) of the code of criminal procedure, the office duties are further qualified to include formal collaboration with the social and health services of municipalities and provinces in order to jointly implement rehabilitation programs that effectively account for the personality traits of young offenders and the specific circumstances of their family and community background. Officers are also expected to report to the Judicial Authority about personal conditions and circumstances, to propose a tailored intervention plan for the assumption of responsibility of the young offender and reintegration, to assist them during the criminal proceedings and to verify the outcomes of the intervention plan until the young person in conflict with the law becomes 21 years old.

Juvenile Penal Institutes (IPM)

The IPM implements the measures involving liberty deprivation ordered by the Judicial in the form of arrest warrants or orders of execution of sentence in respect of the condition of children. Those who enter IPM are between 14 and 21 years old. The specificity of each treatment can be traced to the need for protection of the personality of the child, as guaranteed by the Italian Constitution inspiring our juvenile justice system. The IPM executes the more afflictive criminal measures and implements rehabilitation plans in respect of the rights of the child in custody. The 19 Italian Penal Institutions receive an average of 500 children per year. This figure was fairly stable in the decade 2001-2012 (Source: Department of Juvenile Justice).

Community Service

Communities are structures organized around a family model that host minors under community custody as established in the art.22 DPR n.448/88. These structures also organize educational and work activities to facilitate the social re-inclusion of the young offender, in line with the institutional mandate aimed at social reintegration of the child. The Italian context offers 11 Ministerial Community and a wide range of affiliated private social structures.

The next section describes the standard cost method and data used in the analysis.

3. Cost Analysis: method and data

In Italy, there are no official data about the cost structure for each step of the juvenile justice system. It is possible to recover how much is spent for the public structures of the justice system from the state budget's transfers. This is an aggregate figure that is distributed to each cost source. Little is known about the cost efficiency of the structures at the micro level, public and private, and about the whole public/private system. As a consequence, without data that are aggregated through a "digitalized" bottom-up process, it is not possible to establish what are the components of the system that lack cost efficiency. This situation of minimal information prevents central administrator from optimizing the use of human, financial and material resources of the system by offering the best service quality at minimum cost with evident advantages for both taxpayers and beneficiaries.

This deficit in the system is not specific to Italy, but seems to be, to different extents, a general problem in Europe as well. In order to optimize the resources flowing into the system, the 2011 EJJO green paper recommends that statistically robust data about the entire costs of the judicial measures

per day and per act should be collected along with information about capacity and occupation rates of the structures involved (Pruin 2011).

To advance the quality of judicial decisions the EJJO guidelines advise to collect information on effective duration and delays, either imputable to the Public Administration or the authorized associative sector, of the different stages of the proceedings. On the other hand, to optimize the quality of the care of juvenile offenders it would be important to record information about the level of education care for juveniles in custody or within penitentiary establishments for minors, the inscription rates of minors, either under a form of liberty deprivation or on the loose, that are enrolled in an inclusion program or child friendly treatment such as a mediation procedure, and the proportion of juveniles under 17 that reoffended until they become 21 years old (recidivism)[4] (Jacomy-Vite 2011, Kilkelly 2011).

Our interest here is on the cost efficiency of the system. Fixed and variable costs and duration of custodial sentences are known with uncertainty that we take into account using statistical simulation techniques. We only consider direct costs, though we acknowledge the presence of indirect and intangible costs. In general, fixed costs include management, maintenance and personnel costs, while variable costs include food, linen, water, heating and other variable expenditures.

The method that we propose unfolds as follows:

a) definition of the cost structure of the institutions involved in the juvenile justice system. The institutions are: the CPA, USSM, IPM and Communities. The costs vary also in relation to the services provided. Our cost database therefore also records the costs of judicial services such as the judicial court costs for each hearing and for the probation service with or without study/work activities;
b) definition of the care packages that include the costs of the package of treatments and services received to "cure" young offenders from their "diagnosed" problem borrowing the terminology used in the health sector to define a diagnosis related group (DRG);
c) estimation of a measure of expected standard costs by care package using Monte Carlo simulations of costs, duration of custodial sentences and the distribution of offenders across care packages.

In general, the "standard" cost of each care package per beneficiary is derived by adding the cost of each institution and service included in the offense-related group.

We first illustrate the standard cost method and the statistical technique that we use to reproduce the real world uncertainty associated with standard cost. We then show our cost database and their distributional characteristics. Lastly, we describe the care packages most frequently adopted in the Italian juvenile justice system.

The standard cost method

Standard costs are predetermined estimates of what is expected to cost or should cost to produce one unit of (service) output under normal conditions. The system of standard costs aims at an average valuation of resource consumption. A standard cost for a justice system is the specific cost of a "care

[4] Other aspects affecting the cost structure and the quality of the service relate to characteristics of the management system. Because of the digital gap, the level of dematerialization, that is the reduction in the quantity of paper work required to accompany a young offender through the process, is low. It is often a matter involving also the quality of the paper work. For example, the personality and psychological profile of the young offender is structured more on a qualitative rather than quantitative framework and is only rarely filed electronically and shared on a "cloud" with police and judges.

and service package" for a specific type of offender. It is similar to a diagnosis related group (DRG) for the evaluation of the hospitals' cost effectiveness (Baker 2002, Mayes 2007, Kuntz, Sholtes and Vera 2008). The DRG is a system initially designed to classify hospital cases into one of 467 groups of illnesses. In analogy to the DRG concept, in the context of a juvenile justice system, we define an Offense-Related Group (ORG) of services or care package representing a classification system that groups young offenders according to the consumption of resources and services required for their social reintegration, their personality profile and type of offense. It is a bottom-up approach to effective cost management (Winston and Albright 2009).

To estimate total direct costs of the juvenile justice system we implement a standard cost approach based on ORGs or care package. This allows for cost and efficiency comparisons across justice structures and social services' performance within the system. Further, ORG can be a tool to adjust the method of payment or reimbursement for the private/public structures.

We estimate that fixed and variable costs per young offender are likely to occur within a lower and upper range on the basis of information received from the budget service of the Juvenile Justice Department of the Italian Ministry. We also estimate an expected duration of the period benefitted by young offenders along their rehabilitating course.

We simulate the distribution of expected costs and periods using a PERT distribution that, as shown in Figure 2, is a smoothed version of the triangular distribution and is located to the right of the normal distribution. The PERT distribution, like the Triangular distribution, is commonly used to represent expert estimates of the minimum, maximum and most likely (mode) values of a random variable in a smooth parametric distribution, even if we do not know the mean and standard deviation. This distribution is bounded on both sides (from the minimum and the maximum value), so we avoid unwanted extreme values, and the degree of confidence linearly decreases from the center of the distribution (the mode).

The PERT distribution is a translated and scaled form of the Beta distribution and it is preferable to the Triangular distribution when the distribution is highly skewed (i.e. the most likely parameter is close to minimum or maximum) because it puts less emphasis on extreme values. In fact the mean of the former distribution is four time more sensitive to the most likely value than to the minimum and maximum value, whereas the expected value of the last distribution is equally sensitive to each parameter.

Like the triangular distribution, the PERT distribution stresses the most likely value over the minimum and maximum estimates, but, unlike the triangular ones, it defines a smooth curve. Depending on the three values provided, the PERT distribution can represent a close fit to the normal or lognormal distributions.

Given the lack of actual cost data[5] for each cost source through time, we assume in general a standard predetermined cost structure under normal conditions. We partly account for possible non-linearities

[5] An elementary indicator often used to measure effective custody is the staff/offender ratio. For example, the EJJO 2013 White Paper reports that in Germany the staff-prisoner ratio in youth prison is 1:1,5 complemented by 1 psychologist for 33 up to 147 prisoners and 1 social worker based and working in the institution for 18 up to 50 prisoners. In France, there is a ratio of 1:5 educational staff in juvenile penal establishments.

and economies of scale by assuming a less than proportional range of cost variation.[6] We also account for these features by choosing as the most likely value of the cost distribution of interest the minimum value plus 2/3 of the difference between the maximum and the minimum value.

We simulate the standard cost structure for custodial facilities (CPAs, USSMs, IPMs, and Communities), judicial courts and probation services.

Data: the Standard Costs of Custodial Facilities and Services

Custodial Facilities

CPA. (Fig. 3.1) The expenditure per young offender kept in a First Reception Shelters varies between 630 Euro when the custody period lasts two days to 2600 Euro when custody lasts the maximum allowed period of stay of 4 days. Daily variable costs vary between 15 to 30 Euro per person. Fixed costs of a CPA are larger than fixed costs of IPM because of the presence of diseconomies of scale. Average total costs per person per day in a CPA ranges between 315 to 650 Euro.

IPM. (Fig. 3.2) The daily fixed costs of the penal establishments for minors is about two thirds of the fixed costs of a CPA. The custody period may vary between 60 to 120 days in case of pretrial detention or 90-180 days in case of conviction. Total daily costs per young offender considered socially dangerous in an IPM ranges between 215 to 430 Euro.

It is instructive to compare the costs of juvenile and adult justice. In average, detention of an adult costs daily about 50% less with respect to the cost of detention of a young offender.[7] The regular capacity of the Italian prison system is about 45000. In 2002 when excess capacity was of about 10000 convicts the cost was about 127 Euro, while in 2011 with an over-congestion of more than 22000 convicts the cost is estimated around 113 Euro per convict. At full capacity, after the 2006 pardon[8] that returned to liberty about 30% of the convicts, the cost of conviction of an adult was about 198 Euro.

USSM. (Fig. 3.3) The social service officers compile a personality profile requiring between 6 to 18 hours of work after meetings with the young offender lasting between a minimum of six to a maximum of 10 hours. The process of filing the profile to the judge for the pretrial hearings is assumed to take between 1 to 2 hours. The USSM director is supposed to devote between 1 to 2 hours to the management and supervision of the process. Assuming that the gross hourly cost of a social assistant is 32 Euro/hour and the director's gross hourly salary is 40 Euro, the cost range for the service offered per person by the USSM varies between 456 and 1040 Euro. The cost of the service provided by the USSM is present in all care packages based on offense-related groups.

[6] Economies of scale arise because the greater the quantity of a service produced, the lower the per-person fixed cost that are shared among a larger number of persons either offering or receiving the service. Economies of scale may also reduce variable unitary costs because of operational efficiencies and synergies.

[7] Data about the detention of adult offenders come from an analysis conducted in 2011 by the Centro Studi di Ristretti Orizzonti using data from the State Accountant General, The Court of Accounts and the Justice Ministry, Department of the Prison Administration.

[8] Grant of pardon (Concessione dell'indulto), Law n. 241, 31th July 2006.

Placement in Community and probation. (Fig. 3.4 a and b) Community fixed costs vary between 100 and 125 Euro per person. In case of placement in community (pretrial measure) the average duration is between 60 to 120 days, while for probation the custody period may vary from a minimum of 90 to 540 days. The total cost is calculated on a 365-day period because our aim is to estimate annual costs. A day spent by a young offender in a community is about ½ of the minimum cost and 1/3 of the maximum cost spent in an IPM.

Services

Public Hearings. (Fig. 3.5) There is a minimum of 2 to a maximum of 5 public hearings (initial, pretrial and verification) because all care packages implicate the juvenile court. In each hearing operators involve between 4 to 6 hours at the cost of 32 Euro per hour. Hearing costs vary between 400 and 600 Euro.

Probation[9]. (Fig. 3.6 a and b) Probation can be also implemented outside the communities and with the involvement of USSM (Fig. 3.6a) or a period of study and/or work (Fig. 3.6b). The social operator, paid at a gross salary of 32 Euro per hour, is asked to elaborate a probation plan that may take between 8 to 12 hours of work and to supervise the effectiveness of the plan through a number of meetings varying from a minimum of 1 to a maximum of 6 meetings that may last between 2 to 3 hours. Public hearings may take between 2 to 6 hours per meeting. The mediation procedure may take between a minimum of twelve to thirty hours depending on each case complexity. The Department of Juvenile Justice estimates that about 50% of the minors under probation undertake a mediation process because the procedure requires the consent of both the offender and the victim. Probation periods may be spent either in communities or at the offenders' families. The cost for each probation procedure ranges between about 770 Euro and 2500 Euro. Supervision for studies or work activities (Fig. 3.6b) is exerted through weekly meetings of 2-4 hours. The yearly cost is estimated to vary within the 3300-6700 range of Euro.

We now aggregate the services provided by each cost source in the following Offense-Related Groups or care packages.

4. Description of the Care Packages

We distinguish 8 offense-related groups.

1. **Conviction with pretrial detention**

   Young offenders are arrested and taken to a CPA where they stay for an average period of three days. The judge orders a precautionary measure of a pretrial detention of 30 days. After 4 hearings of dispute, juveniles have to spend 180 days in a juvenile penal institute.

[9] 'Probation' (Article. 28, DPR no.448/88) embeds for a suspension of the process conditional on the commitment of the minor to follow a structured program for a certain period of time. If probation yields a positive outcome, the offense is declared extinct. The project is implemented by Juvenile Services of Juvenile Justice Administration in cooperation with the Local Social Services Offices.

2. **Conviction without pretrial detention**

   Young offenders are arrested and taken to a CPA where they stay for an average period of three days. The judge does not order a precautionary measure. After 4 hearings of dispute, juveniles have to spend 180 days in a in a juvenile penal institute.

3. **Pretrial measures and placement in community**

   Young offenders are arrested and the judge orders a precautionary measure of placement in community for 30 days. After 4 hearings of dispute, juveniles have to spend 180 days in a community.

4. **Custody without pretrial detention**

   Young offenders are denounced on the loose and are taken in charge by USSM for other fulfillments accordance with DPR no. 448/88. This period provides 4 hearings (initial, verification, final).

5. **Custody with pretrial detention**

   Young offenders are taken under custody by USSM for fulfillments in compliance with DPR no. 448/88. During this period the court orders 30 days of detention in an IPM. This period provides 4 hearings (initial, verification, final).

6. **Placement in community and probation**

   Young offenders are denounced on the loose and stay in liberty until pretrial. The trial is suspended after the first hearing and the judge orders a probation period within a community for two years. In the verification hearing the crime is extinguished if the probation period is positive.

7. **Probation with study/work**

   Young offenders are denounced on the loose and stay in liberty until pretrial. The trial is suspended after the first hearing and the judge orders a probation period. The probation plan includes study or work activities and a mediation procedure. In the verification hearing the crime is extinguished if the probation period is positive.

8. **Probation with study/work and pretrial measures**

   Young offenders are arrested and the judge orders a precautionary measure of placement in community for 30 days. The trial is suspended after the first hearing and the judge orders a probation period. The probation plan includes study or work activities and a mediation procedure. In the verification hearing the crime is extinguished if the probation period is positive.

Table 1 summarizes how CPAs, USSMs, IPMs, Communities along with judicial court and probation services contribute to the composition of each care package. It is important to acknowledge that not

all minors undergoing a conviction period pass through a CPA and not all minors passing through a CPA undergo a conviction period (only about 20%). The total cost of each care package depends on the distribution of young offenders across care packages reported in Figure 4 and in the first row of Table 2. The total number of young offenders under custody that we take into account for our estimation is equal to 18400 corresponding to the average of the years 2007-2012. 54.5% of them received judicial pardon without pretrial detention (care package 4). About 6.6% are taken under custody with pretrial detention (care package 5). Convicted young offenders amount to 14.4 % of the total (care packages 1 and 2). About half have been treated without pretrial detention. Communities have offered rehabilitation services to 14.2% of juveniles in conflict with the law, 11.5% followed a probation track. The remaining 10.2% were diverted to probation plans that included study and/or work activities and experienced an alternative mediation procedure. It should be emphasized that the number of young people under custody for the first time were in year 2007 53% of the total, while in year 2012 they reduced to 38%. In our simulation exercise we consider the period average around 50%, so that entrants of the actual and the year previous to the one under consideration balance. It is therefore reasonable to analyze the flow of young offenders as a stock. A young offender entering the juvenile justice system may move across penal paths during the proceedings period. We assume to observe young "patients" at the end of the proceedings, so that they can be reasonably assigned to a specific care package.

5. Results of the Cost Analysis and Simulation

In order to estimate the total direct costs of the juvenile justice system we assign the 18400 minors between 14 and 18 years old under custody to each care package according the distribution described in Figure 4 and in the first line of Table 2.

Estimated total direct costs of the system sum up to 433 million Euro (Table 2). Almost one fourth of the costs (23.3%) are imputable to Sicily, while Triveneto uses only 3.2% of total resources.

As shown in Table 2, the cost of conviction for 14.4% of total young offenders (Care package 1 and 2) amounts to 43% of total costs (185 million Euro). Probation (Care package 6,7 and 8) uses up to 35% of total costs (153 million Euro) but for 21.7% of young offenders. The cost of conviction per offender per year is about 69758 Euro versus probation that costs 38135 Euro. It corresponds to 55% of conviction costs suggesting a potential saving of 45% of resources per each young offender diverted from conviction to the more cost and socially effective probation.

There are interesting regional differences. In Triveneto conviction is mandated to 5.8% of total young offenders and costs 25%, while in Sicily 23.2% of young offenders are deprived of their liberty explaining a cost surge to 62%. In Triveneto, young offenders under probation are 19.1% of the total while in Sicily are 12.6%. The corresponding use of resources by probation amounts to 43% in Triveneto and 19% in Sicily.

Because conviction is fully public while probation is mainly channeled through the non-profit private sector, the relative weight of conviction affects the public/private mix of the service provided by the juvenile justice system. The Italian system is managed by the State for 54% of total expenses and 46% by private social operators paid by the State and/or local municipalities. The public/private mix in Triveneto is 53% while in Sicily is 77%.

Costs depend upon structural characteristics such as the quality of facilities and the number of staffs per offender, the duration of the punishment and the number of young offenders included in an offense-related group. Having estimated costs ranges between a minimum and maximum values, we account for the possibility that unitary costs and duration may vary across facilities and time while keeping the distribution of young offenders fixed. The analysis also provides an indication of possible savings within the system if all custody facilities were operating at minimum costs.

The cost analysis proceeds by constructing a benchmark cost computed at average cost and duration. In order to isolate the contribution total costs of daily costs and duration our simulation compares, in sequence, the cost of each care package computed at minimum costs and duration, at minimum cost and average period, at average cost and minimum period and the ratio of minimum of maximum costs per package (Table 3 and Figure 6 and 7).

Inspection of the last column of Table 3 reveals that if the juvenile justice system minimized both costs and durations would reduce costs with respect to benchmark levels as a term of comparison, by 34%. Minimizing duration would reduce costs by 23%. The sole reduction of costs would allow savings for 15%. The gap between minimum and maximum costs is 51%. If the juvenile justice system were able to minimize both costs and duration, for example reducing court delays, may save more than 50% of public resources almost in all care packages with the exception of package 4 related to custody without pretrial detention and probation with study or work where possible savings amount to about 35%.

Because the costs of a day spent in detention is two to three times larger than the cost of a day spent in a community, it is evident that direct costs may be substantially reduced if a reasonable proportion of children not socially dangerous but held in pretrial detention and other forms of detention. The social desirability of this policy would likely be much higher if we accounted also for the possible benefits stemming from the fact that detention is potentially harmful to children in conflict with the law and is more effective in preventing reoffending.

We now account for the possibility that the distribution of young offenders vary across care packages, while costs and durations are kept fixed. We simulate the impact on the costs of the juvenile justice system of the often-recommended policy by the Juvenile Justice Department that at least 20% of convicted young offenders can be transferred to a more child-friendly reparative solution. In particular, we assume that 20% of young offenders allocated to care package 1 contemplating conviction with pretrial detention move to care package 8, that is, probation under study or work supervision with pretrial measure (Table 4). We assume a similar transfer from care package 2 (conviction without pretrial detention) to care package 7 (probation under study or work supervision).

The total costs of the juvenile justice systems reduces from 433 million Euro to 409 million Euro allowing for 5% of public savings per year. The cost share of conviction (packages 1 and 2) reduces from 43% to 36% while the costs shares of care packages 7 and 8 associated with probation at their families increase by 13 to 17%. Considering that the cost for implementing our hypothesized 20% diversion scheme is negligible, the benefit/cost ratio of the program would be very high. The social profit would be even higher if compared to a situation where nothing had been done.

6. Conclusions

This study revises the Italian youth justice system in order to understand where it can be made more cost efficient. The proposed cost-analysis method based on standard costs by offense-related groups, analogous to the system implemented in the health sector by diagnosis-related groups, illustrates how it can be possibly implemented for the sake of improving the quality of the management and cost monitoring of the system and used for evidence-based policy analyses aiming at correcting distortions both at the national and territorial level in an informed way evaluated for success against outcomes.

In times of crisis, the implementation of formal management and cost control systems gathering and using information to evaluate the performance of organizational resources (human, physical, and financial) and the system as a whole is a crucial concern. Analytical and digitalized accounting can be introduced in traditional management and administration practices at low economic and institutional costs and public resources can be allocated more efficiently, in terms of costs, and effectively in terms of rehabilitating outcomes and recidivism. A more efficient juvenile justice system is also less exposed to the budget cuts dictated by austerity measures that may have undesirable repercussions on the quality of our future generations.

The research estimates that total direct costs of the system amount to 433 million Euro. Almost one fourth of the costs are imputable to Sicily. The cost of conviction per offender per year is about 69758 Euro versus probation that costs 38135 Euro suggesting a potential saving of 45% of public resources per each young offender diverted from conviction to the more cost and socially effective probation. Regional differences are especially informative. In Triveneto conviction is mandated to 5.8% of total young offenders using 25% of resources, while in Sicily the number of convicted children is 23.2% using 62% of resources. In Triveneto, probation is an alternative measure adopted in 21.1% of the cases, while in Sicily only 12.6% with an associated use of resources amounting to 43% in Triveneto and 19% in Sicily.

The Italian system is managed by the State for 54% of total expenses and 46% by private social operators paid by the State and/or local municipalities. The public/private mix in Triveneto is 53% while in Sicily is 77%. This higher dependency rate on the risk of state default is worrisome.

If the juvenile justice system were able to minimize both costs and duration, for example reducing court delays, may save more than 50% of public resources almost in all care packages. The simulation that at least 20% of convicted young offenders are transferred to a more child-friendly reparative solution would allow for 5% of public savings per year. Considering that the cost for implementing our hypothesized 20% diversion scheme is negligible, the benefit/cost ratio of the program can be reasonably expected to be very high.

Diversion and placement in the community are not only effective in reducing recidivism, but also cost efficient. Therefore, a spending review of the youth criminal justice systems may reasonably suggest targeting resources away from detention and towards prevention and diversion policies following a three-pronged strategy: 1. minimize structural costs; 2. reduce duration of punishments by improving the quality of the rehabilitating service also in the penal establishments and wasteful court delays; 3. decreasing the number of children in detention by at least half within the next three years making larger use of community sanctions especially in those regions like Sicily and Campania

where children are more at risk.

Improving the efficiency of youth justice systems saves citizen's money, protects society and is an effective investment on the quality of our young people. To provide our youth who experienced a conflict with the law with the same opportunities to realize their full potential as their peers do, prevention should be a policy priority because, as this study showed, the cost of re-including the excluded is extremely expensive for society and damaging for the child. The public savings stemming from a more efficient youth justice system may be earmarked and reinvested on prevention programs targeted to our vulnerable young people in the geographical areas of the country where they young is more at risk.

In a companion paper (Menon, Perali and Veronesi 2013) estimated the internal rate of social returns stemming from the investment in rehabilitation programs for juvenile offenders by relating benefits and costs for Triveneto and Sicily. Public awareness of the size of these social returns should help policymakers take informed decisions about juvenile justice policies. Based on the household's willingness to pay and the total number of households in Triveneto and Sicily in 2009, the annual benefits that society derives from juvenile rehabilitation programs are about 116 million Euro in Veneto and 148 million Euro in Sicily. Comparing these estimated benefits with the total costs of the juvenile justice system of 14 million Euro in Veneto and of 101 million Euro in Sicily, where the size of the young offender population is about 4 times as in Veneto, we obtain a benefit/cost ratio of 8.3 in Veneto and 1.5 in Sicily. These figures show that investments in rehabilitation programs are highly attractive even during a period of economic crisis and in very different regions. Not necessarily these investments should be funded by transfers from the central government that are likely to be highly infrequent in times of recession. The revealed willingness to pay may be captured, at least in part, through the solidarity channel by fostering innovative social institutions, such as community foundations, designed to pool donations into coordinated and effective social inclusion and prevention programs.

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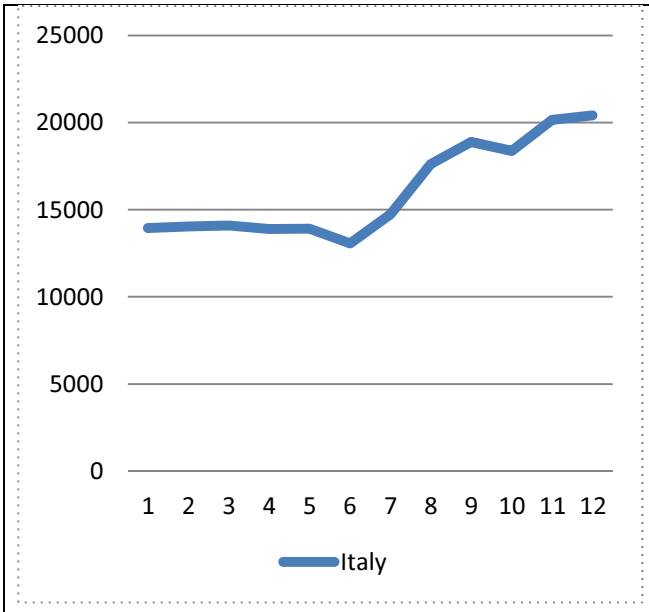
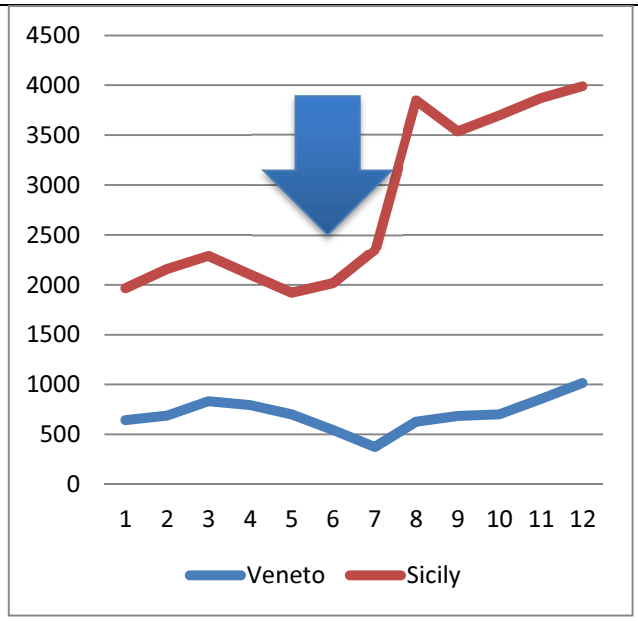
Graph 1. Evolution of Juvenile crime during the Great Recession: Youth under custody in Italy



a) Years 2001-2012



b) Years 2001-2012

Fig. 1. Structure of the Italian Juvenile Justice System

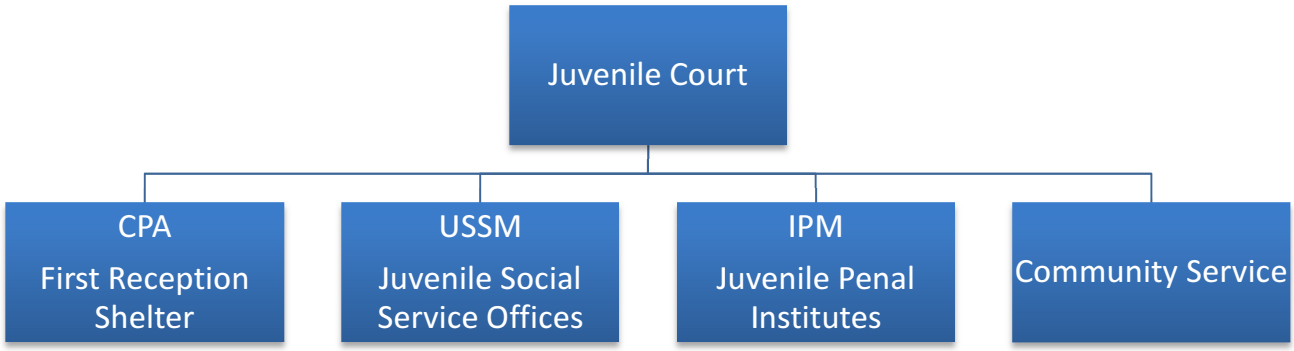


Fig. 2. The PERT distribution compared with the triangular and normal distribution.

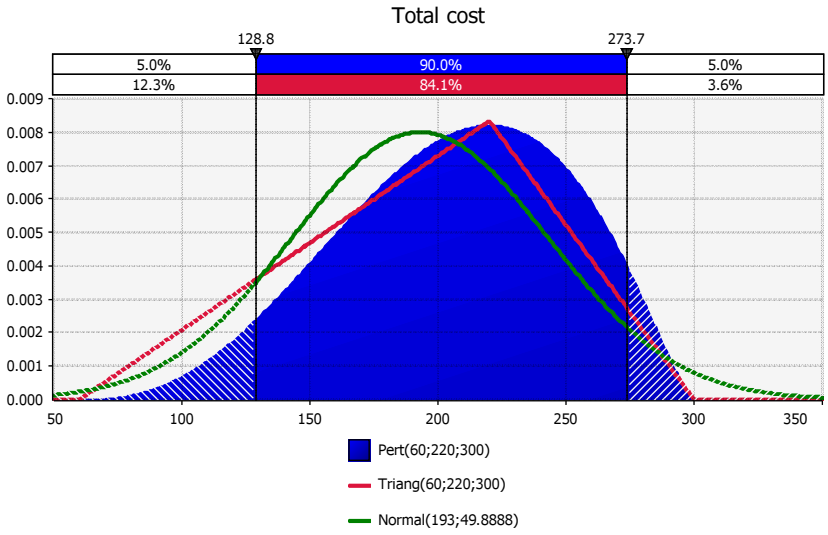


Fig. 3. Standard Costs per Young Offender

Fig. 3.1 First Reception Shelter (CPA)

	Low	High
Daily fixed cost	300	620
Daily variable cost	15	30
Custody period (days)	2	4
Total cost (Euro)	630	2600

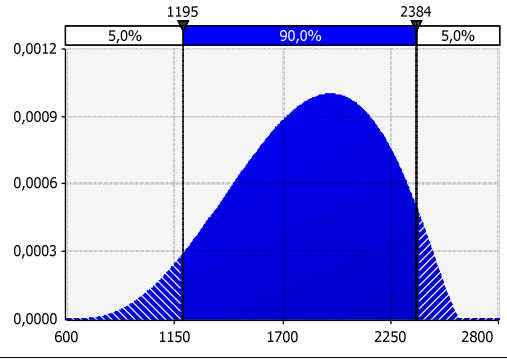
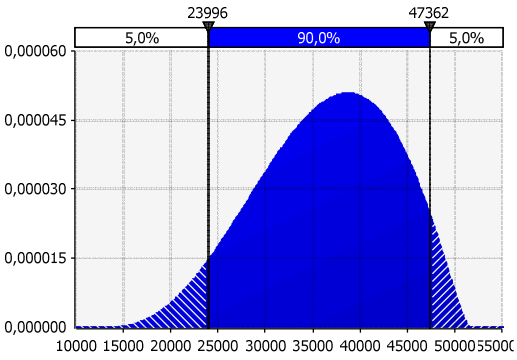


Fig. 3.2 Pretrial Detention / Conviction (IPM)*

	Low	High
Daily fixed cost	200	400
Daily variable cost	15	30
Custody period (days)	60	120
Total cost (Euro)	12900	51600



* In the case of conviction the cost structure is the same but the custody period ranges between 90-180.

Fig. 3.3 Juvenile Social Service Offices (USSM)

	Low	High
Personality Assessment(hrs)	6	18
Meetings (hrs/meeting)	6	10
Description (hrs)	1	2
Archiving practice and mgt (hrs) (director)	1	2
Total cost (Euro)	456	1040
Fixed wage:		
Social worker	32 Euro/hour	
Director	40 Euro/hour	

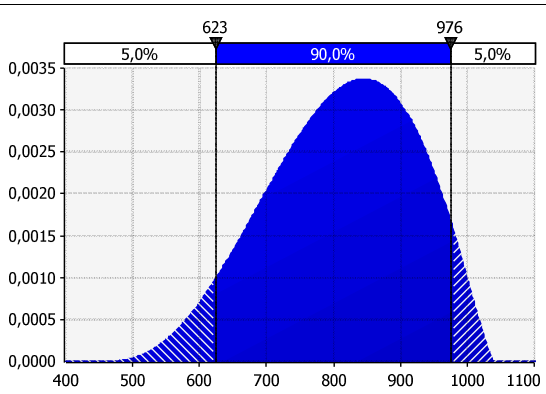


Fig. 3.4a Community costs / pretrial

	Low	High
Daily fixed cost	100	125
Daily variable cost	0	0
Custody period (days)	60	120
Total cost (Euro)	6000	15000

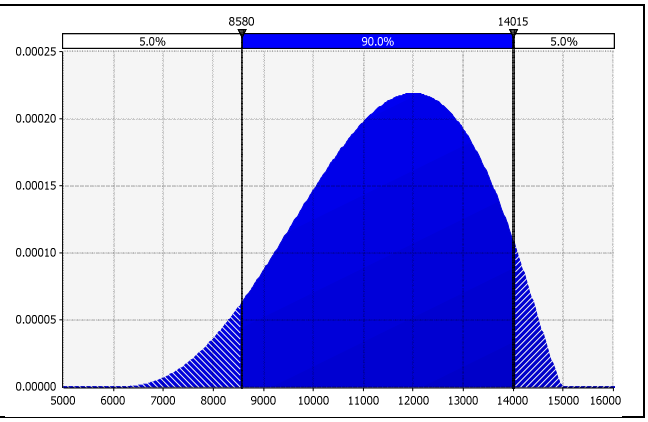
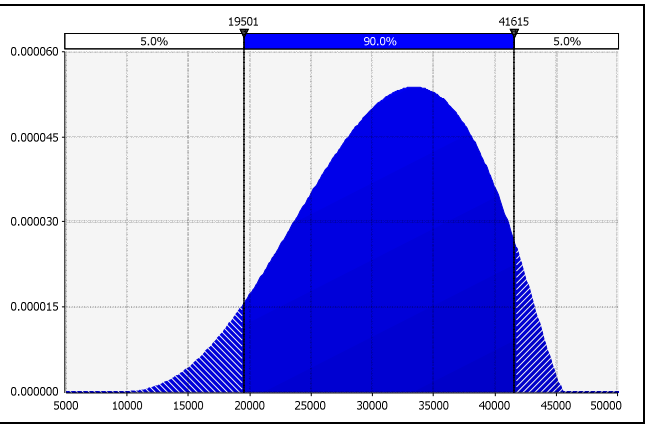


Fig. 3.4b Community costs / probation

	Low	High
Daily fixed cost*	100	125
Daily variable cost	0	0
Custody period (days)	90	365
Total cost (Euro)	9000	45625



* This cost is assumed equal to the transfer per person received by the hosting community.

Fig. 3.5 Hearings (Initial, pretrial, verification)

	Low	High
Hearing cost (Euro)	400	600
Operator hours	4	6
No. of hearings	2	5
Total cost (Euro)	928	3192
Fixed wage: Operator	32 Euro/hour	

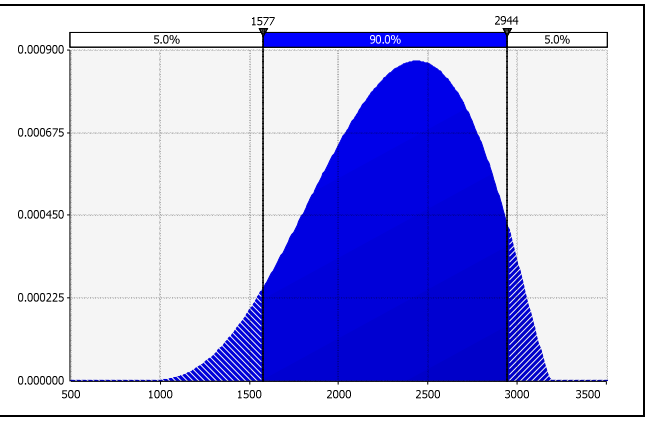


Fig. 3.6a Probation (art. 28 DPR n.448/88)

	Low	High
Project elaboration (hrs)	8	12
Hearing (hrs)	2	6
No. Supervisions/year	1	6
Supervision time by meeting (hrs)	2	3
Mediation (hrs) (when accepted)	12	30
Total cost (Euro)	768	2496
Fixed wage: Operator	32 Euro/hour	

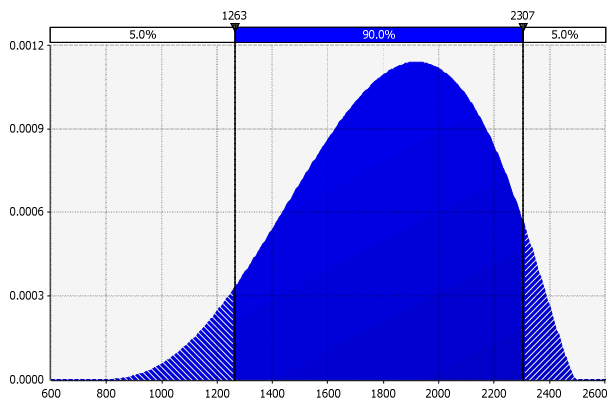


Fig. 3.6b Probation study/work

	Low	High
Supervision (2-4 hrs/week x 52 weeks)	104	208
Total cost (Euro)	3328	6656
Fixed wage: Operator	32 Euro/hour	

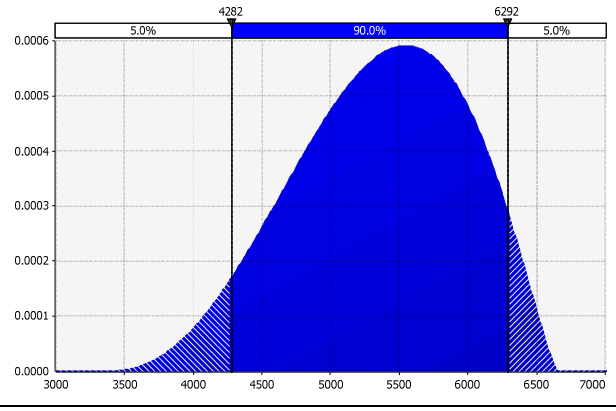
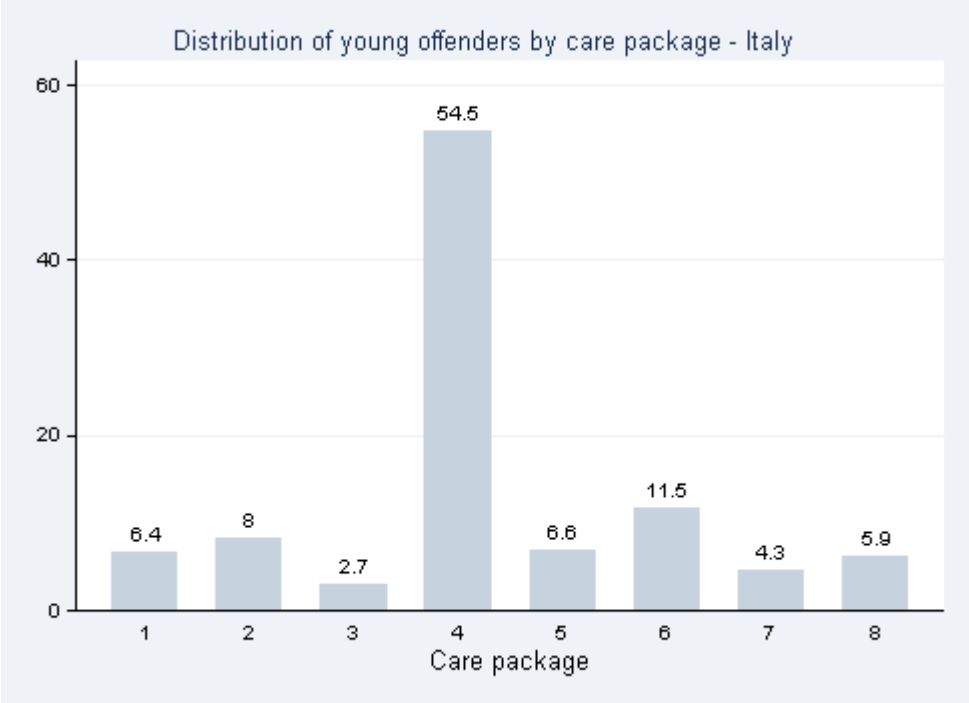


Table 1. Services and Institutions involved in the Composition of Care Packages

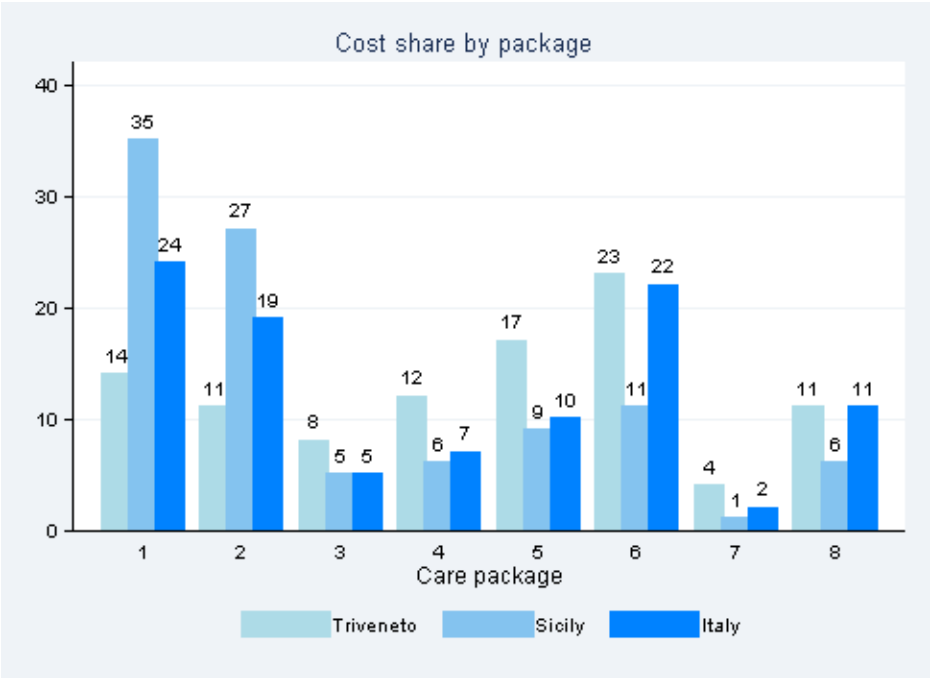
Care Package	Judicial Court (no. hearings)	Probation	USSM	CPA	IPM	Community
1. Conviction with pretrial detention	x		x	x	x	
2. Conviction without pretrial detention	x		x	x	x	
3. Pretrial measures and placement in community	x		x			x
4. Custody without pretrial detention	x		x			
5. Custody with pretrial detention	x		x		x	
6. Placement in community and probation	x	x	x			x
7. Probation with study/work	x	x	x			
8. Probation with study/work and pretrial measures	x	x	x		x	

Fig. 4. Distribution of Young Offenders by Care package in Italy



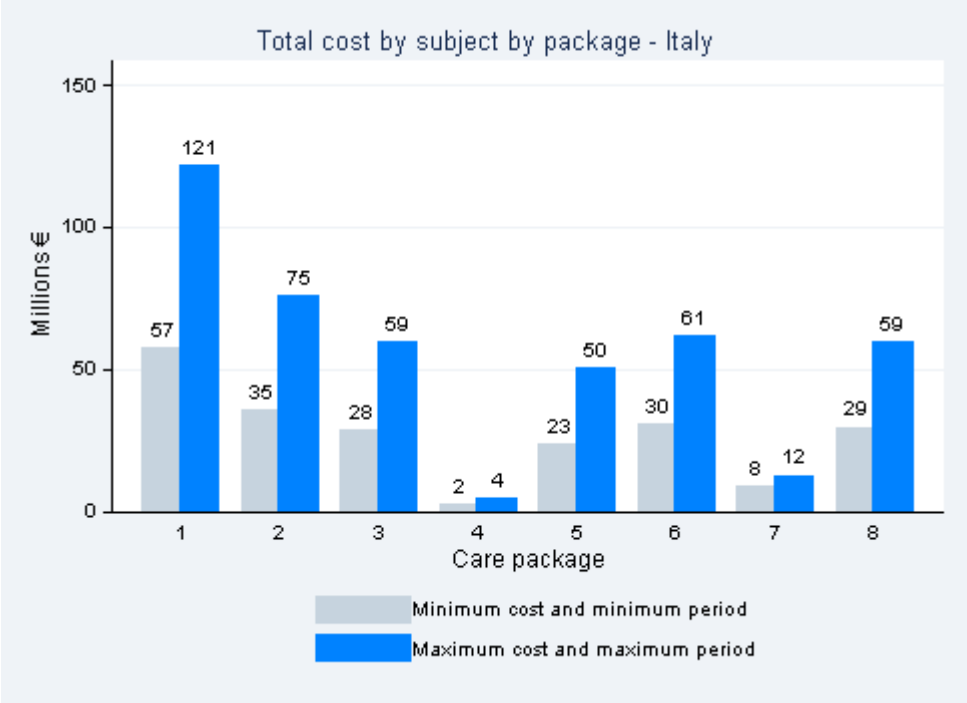
Note: 1.Conviction with pretrial detention; 2.Conviction without pretrial detention; 3.Pretrial measures and placement in community; 4.Custody without pretrial detention; 5.Custody with pretrial detention; 6.Placement in community and probation; 7.Probation with study/work; 8.Probation with study/work and pretrial measures.
* The average number of young offenders entering in the system in the years 2007-2012 is 18400.

Fig. 5. Cost Share by Package



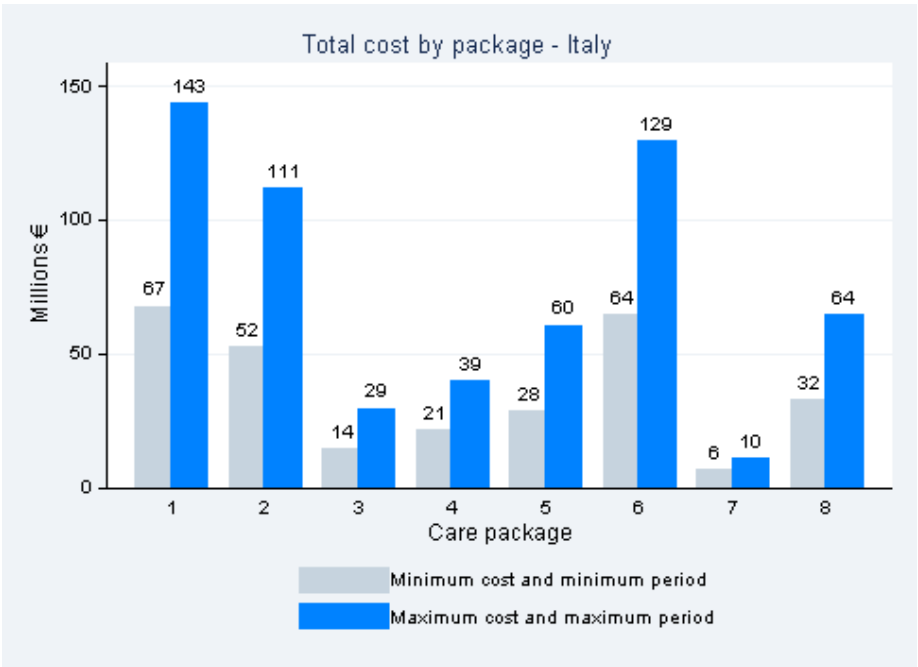
Note: 1.Conviction with pretrial detention; 2.Conviction without pretrial detention; 3.Pretrial measures and placement in community; 4.Custody without pretrial detention; 5.Custody with pretrial detention; 6.Placement in community and probation; 7.Probation with study/work; 8.Probation with study/work and pretrial measures.

Fig. 6. Total Cost by Subject by Package in Italy



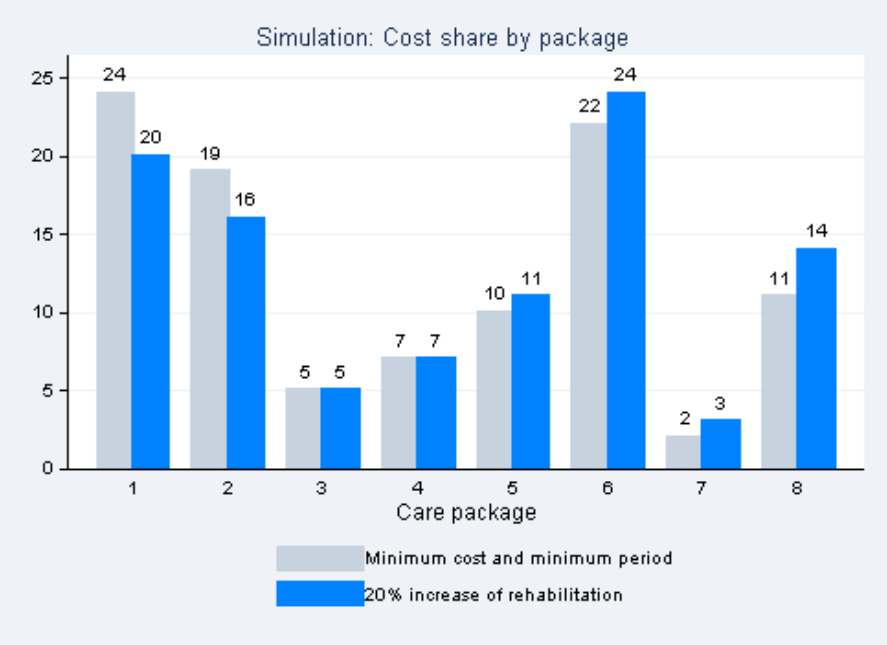
Note: 1.Conviction with pretrial detention; 2.Conviction without pretrial detention; 3.Pretrial measures and placement in community; 4.Custody without pretrial detention; 5.Custody with pretrial detention; 6.Placement in community and probation; 7.Probation with study/work; 8.Probation with study/work and pretrial measures.

Fig. 7. Total Cost by Package in Italy



Note: 1.Conviction with pretrial detention; 2.Conviction without pretrial detention; 3.Pretrial measures and placement in community; 4.Custody without pretrial detention; 5.Custody with pretrial detention; 6.Placement in community and probation; 7.Probation with study/work; 8.Probation with study/work and pretrial measures.

Fig. 8. Simulation (+20% rehabilitation)



Note: 1.Conviction with pretrial detention; 2.Conviction without pretrial detention; 3.Pretrial measures and placement in community; 4.Custody without pretrial detention; 5.Custody with pretrial detention; 6.Placement in community and probation; 7.Probation with study/work; 8.Probation with study/work and pretrial measures.

Table 2. Number of young offenders and total cost by care packages

	Average cost and average period - Benchmark								
	public	**public**	***private***	**public**	**public**	***private***	***private***	***private***	
	Care package 1	Care package 2	Care package 3	Care package 4	Care package 5	Care package 6	Care package 7	Care package 8	
	Conviction with pretrial detention	Conviction without pretrial detention	Pretrial measures and placement in community	Custody without pretrial detention	Custody with pretrial detention	Placement in community and probation	Probation with study/work	Probation with study/work and pretrial measures	Total
Italy (Total No of young offenders 18400)									
Distribution of young offenders	6.4	8.0	2.7	54.5	6.6	11.5	4.3	5.9	100.0
Total costs by care package (millions €)	104	81	22	30	44	97	8	48	433
Cost share by package	24	19	5	7	10	22	2	11	100
Public/total share									0.60
Triveneto (Total No of young offenders 855)									
Distribution of young offenders	2.6	3.2	3.2	64.2	7.7	8.5	6.2	4.4	100.0
Total costs by care package (millions €)	2	2	1	2	2	3	1	2	14
Cost share by package	14	11	8	12	17	23	4	11	100
Public/total share									0.53
Sicily (Total No of young offenders 3871)									
Distribution of young offenders	10.3	12.9	2.7	54.9	6.6	6.6	2.6	3.4	100.0
Total costs by care package (millions €)	35	27	5	6	9	12	1	6	101
Cost share by package	35	27	5	6	9	11	1	6	100
Public/total share									0.77

Table 3. Estimated total cost shares

	public	**public**	***private***	**public**	**public**	***private***	***private***	***private***	
	Care package 1	Care package 2	Care package 3	Care package 4	Care package 5	Care package 6	Care package 7	Care package 8	
	Conviction with pretrial detention	Conviction without pretrial detention	Pretrial measures and placement in community	Custody without pretrial detention	Custody with pretrial detention	Placement in community and probation	Probation with study/work	Probation with study/work and pretrial measures	Total
Min cost and min period / benchmark	0.64	0.64	0.65	0.70	0.64	0.66	0.79	0.67	0.66
Min cost and avg. period / benchmark	0.80	0.80	0.93	0.92	0.81	0.93	0.98	0.84	0.85
Avg. cost and min period / benchmark	0.80	0.80	0.70	0.76	0.80	0.70	0.77	0.79	0.77
Min cost and min period / max cost and max period	0.47	0.47	0.48	0.54	0.47	0.49	0.64	0.50	0.49

Table 4. Simulation of 20% increase of younger offenders for rehabilitation - Italy

	public	**public**	***private***	**public**	**public**	***private***	***private***	***private***	
	Care package 1	Care package 2	Care package 3	Care package 4	Care package 5	Care package 6	Care package 7	Care package 8	
	Conviction with pretrial detention	Conviction without pretrial detention	Pretrial measures and placement in community	Custody without pretrial detention	Custody with pretrial detention	Placement in community and probation	Probation with study/work	Probation with study/work and pretrial measures	Total
Total costs by care package (millions €)	83	65	22	30	44	97	11	58	409
Cost share by package	20.32	15.82	5.33	7.30	10.78	23.62	2.68	14.14	100.00