

Methodology for estimating the impact of the Social Bond 2024

The size of the impact of CDP's Social Bond 2024 is estimated with reference to the following indicators:

- 1) number of jobs created and/or maintained;
- 2) estimated Gross Domestic Product (GDP);
- 3) beneficiaries:
 - i) number of students served through school, university and childcare interventions;
 - ii) number of patients served, and beds created and/or upgraded through interventions in the health sector;
 - iii) number of beneficiary enterprises.

1. Methodology for estimating economic and employment impact

The CDP-SAM¹ (Social Accounting Matrix) macroeconomic model was used to analyse the impact on the Italian economic system of the investments supported through the allocation of the Social Bond.

The model is based on the social accounting matrix for Italy (built internally on the Resources and Uses tables published by ISTAT, latest available year 2019), which provides a detailed picture of the economic and social transactions that occur within an economy over a given period of time, usually one year. This approach is based on a matrix that includes all economic income and expenditure between different actors in an economy (such as households, businesses, government, and the foreign sector) and sectors.

The key points of modelling SAM² are:

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¹ On the model building methodology see Mandras, G., Conte, A., & Salotti, S. (2019). The RHOMOLO-IO modelling framework: a flexible Input-Output tool for policy analysis, European Commission Working Papers on Territorial Modelling and Analysis e Aray, H., Pedauga, L., & Velázquez, A. (2017). Financial Social Accounting Matrix: a useful tool for understanding the macro-financial linkages of an economy, Economic Systems Research.

² The estimation methodology implies some simplifying hypothesis/assumptions: (i) it is assumed that the economic system is initially in equilibrium and that the increase in demand is met with an increase in output (and not in stocks), (ii) economies of scale are not considered as primary production inputs (capital and labour) are employed in the same proportions and substitution effects are absent, (iii) hourly wages, hours worked,



- a very detailed structure of the economic system that allows an in-depth analysis of the interactions between the various economic sectors and agents, also offering a comprehensive view of the different links between economic activities;
- a specific representation of both economic flows (such as production, consumption, investment) and social flows (such as income distribution, money transfers between households or by the government);
- the ability to examine elasticity in sector/agent interactions in a timely manner, observing how a change within one sector is transmitted to others, facilitating an integrated analysis of the economy. This implies the possibility of assessing the impacts on the direct beneficiaries of the operations (direct effect) and the related spillovers that propagate to the other economic sectors as a result of both inter-sectoral exchange flows (indirect effect) and the increased consumption activated along the entire supply chain (induced effect). More specifically, it was possible to quantify:
 - direct effects: impact on sectors directly affected by interventions financed by the Social Bond;
 - indirect effects: impact on the subcontracting chains of the sectors directly affected by interventions financed by the Social Bond;
 - induced effects: impact generated due to consumption fostered by the additional income flows to households as a result of increased economic activity.

The described approach made it possible to estimate how the 750 million euro resources allocated through the Social Bond generated a direct impact on national aggregate demand by producing impacts in terms of gross domestic product (GDP) and jobs created and/or retained (i.e. linked to the production workforce needs triggered by the investments).

More specifically, for employment impacts, jobs are measured in FTE (i.e. Full-time Equivalent Labour Unit): this is the amount of work performed in the year by a full-time employee, a unit of measurement of

relative intensity of domestic and imported production and employment intensity and value added are kept fixed (exogenous), and (iv) technological progress is absent.



the volume of labour employed in the production of goods and services included in the Gross Domestic Product estimates used by ISTAT³.

The resource vector used for the activation of the CDP-SAM model considers only the effects produced by the resources allocated, with no dragging effects on the economic system. By construction, the estimate anticipates the demand impacts generated by the resources committed in the year to 2024, even though these impacts could occur over a longer timeframe.

The results obtained from the CDP-SAM model at the national level were subsequently integrated into a Multi-Regional Input Output (MRIO) model which, through the study of the interdependencies between regional economic systems, makes it possible to estimate how the total impacts are distributed over the territory.

This second model⁴, disaggregated into four macro-areas (North-East, North-West, Centre and South) and 54 productive sectors, allows, through the analysis of the interdependencies between macro-areas (a peculiar element of the MRIO models), to determine the capacity of the territory to internalise (retain) the multiplicative effect of both the domestic final demand and that coming from the other macro-areas.

The model's predictive capacity regarding the effects on the national economic system and employment of investments made with the allocated funds clearly depends on the ability to correctly attribute spending flows to the various items of the expected products in the input-output matrix classification and to the geographic areas of investment destination.

³ A homogeneous unit of measurement of the amount of work done by employed people. The work unit represents the amount of work performed during the year by a full-time employee and provides the unit of measurement for the amount of work performed by part-time employees, part-time employees (e.g. because they are laid off or have a double job), and employees with working hours of less than one year. Glossary, ISTAT. ⁴ Based on input output tables estimated by the "Istituto Regionale Programmazione Economica Toscana" (IRPET).

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2. Beneficiary Estimation Methodology

In order to delineate a further dimension of the social impact generated by the Bond, the **beneficiaries** of the funded interventions were estimated for each eligible category identified in the framework.

Public Education

For the Public Education sector, the **beneficiaries** are the students and children enrolled in the schools, universities and kindergartens for which building interventions were financed. The number of students was identified using different approaches, depending on the availability of data. The criteria used can be listed as follows:

- Direct attribution (use of the funded institution's data);
- Direct attribution through KPI (use of the data declared by the entity in the CDP financing phase);
- Indirect attribution by school order on average municipal data;

Overall, direct attribution of student beneficiaries was possible for 52% of the portfolio. This percentage is distributed differently among the types of intervention. It should also be noted that for kindergartens, funding very often concerns new buildings, and it is never possible to arrive at a direct attribution of the number of beneficiary students⁵.

For all measures in the University sector, it was possible to identify the beneficiary students directly, using the databases of the Italian Ministry of University and Research and attributing to each University the number of students enrolled for the academic year corresponding to the year in which the CDP loan was disbursed.

For school building interventions (including school sports facilities) for which it was possible to directly attribute the number of beneficiary students at each school, the Ministry of Education and Merit of Italy and the CDP databases were used for all operations with KPIs.

For the portfolio operations for which it was not possible to attribute the precise data, the average number of students from schools of the same municipality and the same level was used as a proxy for the beneficiaries of each school, applying the following formula:

⁵ Exceptions to this are cases where the KPI declared by the entity at the stage of stipulating the loan with CDP was used.

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$$Students_{ir}^{(k)} = \frac{\sum_{j=1}^{n} Students_{jr}^{(k)}}{n_r^{(k)}} \quad with \ i \neq j$$
(6)

Where k is the school order (with k = kindergarten, childhood school, primary, lower secondary, secondary), and j is the j-th school in the same municipality r of the school i⁶.

For a residual part of the initiatives (about 3%), the estimation was made on a provincial basis, so the above formulation should be rewritten without specifying school order k and with j equal to the j-th school in the same province r of the school i.

Healthcare

Given the peculiarities of the healthcare sector, it was not possible to use a single metric to identify the **beneficiaries** in this area of intervention. In fact, the different functions performed by the national health structures, the different level of their use by the population and the high variety of the health services offered, do not allow the univocal identification of the pool of users benefiting from the health services.

Given the above, and depending on the characteristics of the healthcare facilities funded by the portfolio, it was therefore possible to estimate:

- 1. The number of beds built and/or upgraded for facilities such as:
- Nursing homes, rehabilitation clinics and clinics for the elderly;
- university hospitals;
- hospitals and emergency rooms;
- 2. The number of patients served for facilities such as:
- Local Health Authorities;
- multi-purpose centres, clinics and health homes;
- Counselling clinic centres;

⁶ For all school levels, including childhood schools, Ministry of Education and Merit of Italy data were used, for kindergartens ISTAT data were used.



- 3. The municipal population served for facilities such as:
- rural pharmacies;
- medical offices;

4. The **number of patients potentially treatable** for the R&D project on the development of new therapeutic solutions for the treatment of rare diseases.

For all the facilities listed in point 1 it was therefore assumed that one bed corresponded to one beneficiary. The attribution of beds for each facility was carried out in a direct manner, where the precise data on the facility financed or the KPI declared by the entity when the CDP loan was stipulated was available.

For cases in which it was not possible to attribute the number of beds directly, the Ministry of Health databases were used. Specifically, the average number of beds per type of health facility per province was used as a proxy for the beds built or upgraded⁷, according to the following formulation:

N.
$$beds_{ir} = \frac{\sum_{j=1}^{n} beds_{jr}^{(k)}}{n_r^{(k)}}$$
 with $i \neq j$ (7)

Where k is the type of facility (with k=hospital, emergency room, nursing home, rehabilitation clinics and clinics for the elderly⁸), and j is the j-th facility in the same province r as health facility i.

For the facilities reported in point 2, given the different types of healthcare services provided, the number of patients served was estimated using data from the National Healthcare System Statistical Yearbook 2022 (Ministry of Health). Specifically, it was decided to use as a proxy for the number of beneficiary patients, the number of clinical and laboratory services provided per individual health facility, assuming the identity: 1 service = 1 beneficiary patient. The estimate was then made using the average regional per capita number of clinical and laboratory services per single health facility, multiplied by the population of the municipality (or region) in which the financed facility is located, according to the following formulation:

$$N.patient_{ijr} = N.average \ service \ pp_r \ x \ Pop_{jr} \quad with \ i \neq j \neq r$$
 (8)

⁷ Data source: Ministry of Health.

⁸ For nursing homes rehabilitation clinics and clinics for the elderly, the number of nursing homes per province was used as a single figure.



Where *N*. *patient*_{*ijr*} are the patients of the i-th healthcare facility of municipality j in region r, *N*. *average service* pp_r are the average per capita services per facility of the region where the funded facility i is located, and Pop_{jr} is the population of the j-th municipality (of region r) where healthcare facility i is located. Moreover, j will coincide with r for all those financed facilities for which it is not possible to identify a municipal territory where the financed facility is located, therefore, the reference population for the calculation of the beneficiary patients will be the regional one.

For the facilities listed in point 3, a full correspondence between the beneficiaries and the population of the municipality in which the facility is located was assumed.

Lastly, for the number of **patients potentially treatable** through the R&D project on the development of new therapeutic solutions for the treatment of rare diseases, the population incidence percentages (*Tab. 1*) of the diseases potentially treatable by the therapeutic solutions were used.

The population used as reference is the Italian one, however, with respect to a hypothetical future commercialisation of the therapeutic solutions, the reference population and the number of potential beneficiaries could certainly be higher.

Population incidence parameters	Beneficiaries (#)*
1 over 2,000	29,495
1.6 - 7.4 over 100,000	2,655
0.4 - 2 over 100,000	708
3.6 over 100,000	2,124
1 - 1.5 over 1,000,000	74

TAB.1 – POPULATION INCIDENCE OF DISEASES TREATABLE BY EXPERIMENTAL THERAPEUTICAL SOLUTIONS

* Estimate based on the Italian population in 2024.