

# Evaluating the Impact of the National Recovery and Resilience Plan on Municipal Development and Well-Being in Italy

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# The National Recovery and Resilience Plan (NRRP)

- Italy is the largest beneficiary of the EU Recovery and Resilience Facility (RRF), expected to receive nearly **€195 billion** in grants and concessional loans by 2026.
- The NRRP is structured around **six missions**: digitalisation, innovation, competitiveness, culture and tourism; green revolution and ecological transition; infrastructure for sustainable mobility; education and research; inclusion and cohesion; healthcare.
- By mid-2025, Italy had secured **62.8%** of total NRRP resources (about **€122 billion**), well above the EU average (48.8%), but only **33.8%** (about **€65.7 billion**) had been spent.
- Municipalities play a central role in implementation:
  - over **50,000 projects** (out of nearly 140,000) are implemented at the municipal level;
  - approximately **€26 billion** is directly allocated to municipalities.

# Objective of the Study

- The study aims to assess the **perceived impact** of NRRP funds allocated to Italian municipalities.
- Particular attention is devoted to:
  - territorial disparities;
  - heterogeneity across municipalities by population size, macro-area, and income level.
- The analysis focuses on four main policy areas:
  - digital transition;
  - green transition;
  - social inclusion;
  - tourism and accessibility.
- A survey was administered to **all Italian municipalities**.
- **376 municipalities** (almost **5%** of the total) completed the questionnaire.

# The questionnaire

The questionnaire captures the perceived effects of NRRP interventions across the main policy domains: territorial development, social inclusion, culture, tourism and accessibility, and digitalisation.

Within each domain, the survey collects:

- **qualitative assessments**, capturing municipalities' overall evaluations and perceived effectiveness of policies, expressed through ordered response scales;
- **quantitative indicators**, measuring concrete outputs and outcomes (e.g. counts, capacities, coverage levels) expressed in natural units.

# The questionnaire

- The questionnaire was administered between **October 2025 and February 2026** to the **full population of Italian municipalities** (7,896 units).
- Data collection was managed by **TelePerformance**, a firm specialized in survey operations and data analysis.
- Data were collected using a **Computer-Aided Web Interview (CAWI)** methodology, complemented by telephone interviews and follow-up contacts.
- Respondents included administrative staff and heads of technical offices involved in NRRP activities, with the participation of political representatives (mayors or deputy mayors) when relevant.
- Given the typically **low response rates** in surveys of local governments, a **census-based approach** was adopted instead of a stratified sample.
- In total, **376 municipalities** completed the questionnaire.

# Municipality-level perceived impact

Given the relatively small sample size and the fact that almost all Italian municipalities received NRRP funds for major components (e.g. digitalisation), our empirical strategy follows an established literature (Aucejo et al., 2020; Arcidiacono et al., 2020; Wiswall and Zafar, 2020).

Municipalities are asked to report expected outcomes in two states of the world:

- with NRRP funding;
- without NRRP funding (counterfactual).

# Municipality-level perceived impact

The perceived impact for municipality  $i$  is defined as:

$$\Delta_i = Y_{i,2026}^{\text{with NRRP}} - Y_{i,2026}^{\text{without NRRP}}$$

The first term represents the expected outcome under NRRP funding for municipality  $i$  in 2026, while the second term denotes the expected counterfactual outcome in the absence of such funding.

The choice of **2026** as the reference year is motivated by the institutional design of the NRRP:

- all NRRP-funded projects are scheduled to be completed by 2026;
- 2026 is therefore the first year in which the full effects of the interventions are expected to materialise.

# Municipality-level perceived impact: Categorical questions

The questionnaire includes two types of questions: categorical and numerical.

For categorical outcomes, municipalities are asked:

- **Outcome with NRRP:** e.g. “Between 2021 and 2026, how has the use of renewable energy in the municipal territory changed?”
- **Counterfactual outcome:** “In the absence of NRRP funds, how would the use of renewable energy have changed over the same period?”

Responses are measured on a scale from  $-2$  (strongly worsened) to  $+2$  (strongly improved).

The impact measure is the difference between the two responses, ranging from  $-4$  (maximum negative impact) to  $+4$  (maximum positive impact).

# Municipality-level perceived impact: Numerical questions

For numerical outcomes, municipalities report:

- the expected outcome with NRRP funding (e.g. number of digital services implemented);
- the expected counterfactual outcome in the absence of NRRP funding.

The perceived impact is computed as the arithmetic difference between the two values.

# Convergence indicator

To assess whether NRRP funding contributes to reducing territorial disparities, we compute a convergence indicator for quantitative outcomes:

$$E[\Delta_{\text{low}}] - E[\Delta_{\text{high}}]$$

This indicator compares the average perceived impact for municipalities below and above the median 2021 baseline value.

- A positive value indicates stronger effects among initially worse-performing municipalities (convergence).
- A negative value indicates stronger effects among initially better-performing municipalities (divergence).

We further explore heterogeneity in perceived impacts across municipalities by:

- population size (municipalities under vs over 5000 inhabitants);
- macro-area (North vs South and Islands);
- baseline income levels (municipalities under vs over the median of income)
- heterogeneity of the bureaucratic capacity (municipalities under vs over the median of the index)

The key assumption underlying this approach is that municipalities hold well-formed and internally consistent expectations about outcomes in both states of the world. This assumption is plausible in our context for two reasons.

- First, the counterfactual scenario, namely the absence of NRRP funding, corresponds to a realistic policy environment that municipalities have recently experienced.
- Second, municipalities have detailed institutional knowledge of local investment and planning processes, which puts them in a strong position to assess how the results would have evolved in the absence of external funding.

**Table 1: Geographic distribution of the sample**

Area	Sample		Italy	
	Frequency	%	Frequency	%
North West	115	30.59	2,995	37.89
North East	78	20.74	1,390	17.59
Centre	67	17.82	968	12.25
South	70	18.62	1,783	22.56
Islands	46	12.23	768	9.72
<b>Total</b>	<b>376</b>	<b>100.00</b>	<b>7,904</b>	<b>100.00</b>

**Table 2: Sample composition by population size**

Population class	Sample		Italy	
	Frequency	%	Frequency	%
0–3,000	186	49.40	4,451	56.31
3,000–5,000	38	10.11	1,082	13.69
5,000–10,000	52	13.83	1,167	14.76
10,000–20,000	47	12.53	694	8.78
Over 20,000	53	14.10	510	6.45
<b>Total</b>	<b>376</b>	<b>100.00</b>	<b>7,904</b>	<b>100.00</b>

*Note: The sample broadly reflects the national distribution of municipalities.*

# Results 1: Energy sustainability and renewables

Variable	Obs.	With	Without	$\Delta$	$\mathcal{P}(\Delta > 0)$	$\mathcal{P}(\Delta = 0)$	$\mathcal{P}(\Delta < 0)$	$\Delta_{\text{low}} - \Delta_{\text{high}}$
Energy sustainability within the municipal territory (C)	187	1.16	-0.73	1.89***	0.95	0.04	0.01	NA
Savings in annual primary energy consumption (C)	185	1.17	-0.76	1.93***	0.95	0.04	0.01	NA
Installed renewable energy capacity (C)	170	1.05	-0.75	1.80***	0.94	0.05	0.01	NA
MWh produced from renewable sources (N)	83	935.17	919.92	15.26***	0.31	0.65	0.04	-14.12
School primary energy consumption per 100 students (N)	70	532.39	538.72	-6.34*	0.03	0.71	0.26	13.36*
Recycling rate (N)	87	59.28	56.34	2.94**	0.17	0.78	0.05	1.42
High hydrogeological risk area per 100 residents (N)	80	3.13	3.21	-0.08*	0.04	0.86	0.10	0.17**

Notes: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ . C = categorical; N = numerical.

# Heterogeneity summary: Energy sustainability and renewables

	South vs North	< 5,000 vs > 5,000 inh.	Income p.c. below vs above median	Bureaucratic index below vs above median
Energy sustainability (C)	-0.18	0.23	-0.14	-0.04
Primary energy savings (C)	-0.18	0.20	-0.11	0.06
Installed renewable capacity (C)	-0.26	0.17	-0.07	0.02
Renewable energy production (MWh) (N)	-8.01	-14.09	2.71	6.48
Renewables per 100 residents (N)	-0.32	0.99	0.27	1.31
School energy consumption (MWh) (N)	-20.46	0.29	9.46	14.34
School energy per 100 students (N)	-1.83	-5.91	8.57	6.64
Recycling rate (N)	-0.82	3.04	0.72	-2.37
High hydrogeological risk area (km <sup>2</sup> ) (N)	16.41	15.39	10.85	12.06
Risk area per 100 residents (N)	0.17	-0.03	0.10	-0.02

Notes: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ . C = categorical; N = numerical.

## Results 2: Social infrastructure

Variable	Obs.	With	Without	$\Delta$	$\mathcal{P}(\Delta > 0)$	$\mathcal{P}(\Delta = 0)$	$\mathcal{P}(\Delta < 0)$	$\Delta_{\text{low}} - \Delta_{\text{high}}$
Services promoting social inclusion (C)	160	0.93	-0.86	1.79***	0.97	0.03	0.00	NA
Socio-economic wellbeing of citizens (C)	152	0.74	-0.88	1.62***	0.97	0.03	0.00	NA
Places in nurseries and preschools per child aged 0–6 (N)	102	25.38	20.84	4.54***	0.38	0.61	0.01	-1.21
Municipal gym space (sqm) per 100 residents aged 3–14 (N)	85	151.26	165.48	-14.22	0.15	0.84	0.01	-67.58
Canteen sqm per child aged 0–6 (N)	85	46.56	42.37	4.19***	0.19	0.81	0.00	-0.25
Sports facilities constructed/renovated per population (N)	96	0.07	0.04	0.03*	0.24	0.74	0.02	0.01

Notes: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ . C = categorical; N = numerical.

## Heterogeneity summary: Social infrastructure

	South vs North	< 5,000 vs > 5,000 inh.	Income p.c. below vs above median	Bureaucratic index below vs above median
Social inclusion services (C)	-0.08	-0.26*	0.16	0.14
Socio-economic wellbeing (C)	-0.05	-0.10	0.18	0.07
Nursery places per child 0–6 (N)	-4.30**	2.39	-5.46***	-0.68
Total gym space (sqm) (N)	-24.43	-107.74**	39.67	29.84
Gym sqm per 100 residents 3–14 (N)	-41.41	-36.21	30.91	-34.62
Canteen sqm per child 0–6 (N)	-4.21	-5.08*	-1.43	1.50
Sports facilities per population (N)	0.02	0.05	-0.03	-0.02

Notes: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ . C = categorical; N = numerical.

## Results 3: Tourism and accessibility

Variable	Obs.	With	Without	$\Delta$	$\mathcal{P}(\Delta > 0)$	$\mathcal{P}(\Delta = 0)$	$\mathcal{P}(\Delta < 0)$	$\Delta_{\text{low}} - \Delta_{\text{high}}$
Tourist attractiveness (C)	130	0.76	-0.71	1.47***	0.92	0.08	0.01	NA
Ability to attract new residents (C)	135	0.69	-0.78	1.47***	0.93	0.07	0.00	NA
Physical and cognitive accessibility to public spaces (C)	138	0.96	-0.72	1.68***	0.94	0.05	0.01	NA
Interventions aimed at improving accessibility (N)	84	3.33	2.12	1.21***	0.40	0.58	0.01	-0.58
Accessibility interventions per 100 residents (N)	83	0.19	0.14	0.05**	0.41	0.58	0.01	0.06

Notes: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ . C = categorical; N = numerical.

## Heterogeneity summary: Tourism and accessibility

	<b>South vs North</b>	<b>&lt; 5,000 vs &gt; 5,000 inh.</b>	<b>Income p.c. below vs above median</b>	<b>Bureaucratic index below vs above median</b>
Tourist attractiveness (C)	-0.17	-0.00	0.07	0.00
Ability to attract new residents (C)	-0.10	-0.05	0.15	0.17
Accessibility of public spaces (C)	-0.14	-0.23	0.23	0.01
Accessibility interventions (N)	-0.48	-0.52	0.60	1.32**
Accessibility per 100 residents (N)	-0.06	0.06*	0.00	0.10**

Notes: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ . C = categorical; N = numerical.

## Results 4: Digitalisation

Variable	Obs.	With	Without	$\Delta$	$\mathcal{P}(\Delta > 0)$	$\mathcal{P}(\Delta = 0)$	$\mathcal{P}(\Delta < 0)$	$\Delta_{\text{low}} - \Delta_{\text{high}}$
Digital public services for citizens (C)	262	1.66	-0.55	2.20***	0.99	0.01	0.00	NA
Digital public services for businesses (C)	238	1.32	-0.64	1.96***	0.99	0.01	0.00	NA
Digitalisation of the municipal authority (C)	269	1.68	-0.48	2.16***	0.99	0.01	0.00	NA
Services with payments active via PagoPA (N)	208	27.86	17.81	10.05***	0.57	0.42	0.00	-2.40
Online services accessible through SPID/CIE (N)	205	18.25	10.56	7.69***	0.60	0.39	0.01	-4.75
Services integrated into the "IO" app (N)	207	19.06	8.47	10.58***	0.55	0.45	0.00	-1.75
Services migrated to the cloud (N)	201	11.89	6.95	4.95***	0.55	0.43	0.01	0.22
Municipal employees participating in IT training (N)	200	37.92	29.76	8.16***	0.41	0.58	0.01	-6.78
Employees participating in IT training per worker (N)	197	122.20	82.19	40.01*	0.41	0.58	0.01	-29.35

Notes: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ . C = categorical; N = numerical.

# Heterogeneity summary: Digitalisation

	South vs North	< 5,000 vs > 5,000 inh.	Income p.c. below vs above median	Bureaucratic index below vs above median
Digital services for citizens (C)	0.06	-0.08	0.10	-0.01
Digital services for businesses (C)	0.21	0.11	0.07	0.01
Municipal digitalisation (C)	-0.01	-0.03	-0.05	-0.02
PagoPA services (N)	-0.39	-2.32	1.02	1.45
SPID/CIE services (N)	0.83	-5.94*	2.65	-2.58
IO app services (N)	0.09	-4.19*	3.24	1.66
Cloud-migrated services (N)	-0.57	-3.21***	1.87*	0.42
Employees in IT training (N)	4.74	-14.95***	10.50**	6.48
IT training per worker (N)	30.30	42.03	43.03	32.99

Notes: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ . C = categorical; N = numerical.

# Main findings

- Overall, the evidence points to **consistently positive perceived NRRP impacts** across the four domains considered.
- **Qualitative indicators** show large average effects and a high share of municipalities with  $\Delta > 0$ , indicating broad agreement that NRRP funding is expected to improve sustainability outcomes, social infrastructure and well-being, tourism and accessibility, and digital public services.
- A recurrent pattern emerges when moving from **qualitative to quantitative** measures: while average effects remain positive, quantified changes are **less pervasive**, with substantial probability mass at  $\Delta = 0$  for several indicators.
- Evidence of **convergence** is limited: baseline-based comparisons provide little support for a systematic gap-reducing effect of NRRP interventions.
- When heterogeneity is statistically relevant, it is more strongly associated with **differences in scale and administrative capacity** than with disadvantaged initial economic or territorial conditions.

# Heterogeneity in perceived NRRP impacts: key messages

- **Geographical heterogeneity (South vs North)** is generally limited: perceived impacts are broadly similar across macro-areas, with no systematic evidence of stronger effects in either Southern or Northern municipalities.
- **Population size matters for selected outcomes:** smaller municipalities tend to report weaker perceived impacts, particularly in *social infrastructure* and *digitalisation*, suggesting scale-related constraints in project implementation.
- **Income per capita heterogeneity is modest:** differences between municipalities below and above the median income level are rarely statistically significant, indicating that perceived NRRP effects are not strongly income-driven.
- **Administrative and bureaucratic capacity plays a key role:** municipalities with higher bureaucratic capacity report significantly larger perceived impacts in *tourism and accessibility* and *digitalisation*, especially for quantitative outcomes.
- Overall, heterogeneity patterns suggest that **implementation capacity**, rather than initial economic conditions or geography, is the main driver of differential perceived impacts of NRRP funds.