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Are Incentives for Energy Retrofitting Regressive? Evidence from the Italian Superbonus

Lorenzo Forni[*], Elena Giarda[†], Stephan Sommer[‡]

June 2025

Abstract

This paper investigates the distributional effects of the Italian Superbonus program, a generous tax incentive that reimbursed up to 110% of household energy retrofitting expenditures. Using data from the Italian Survey of Consumer Expectations, we analyze access to and utilization of the Superbonus across income groups. Our findings indicate that the program has been mildly regressive at the population level, with higher-income households more likely to undertake retrofitting and receive a greater share of public funds. However, among those who accessed public money to retrofit their homes, public support was distributed more evenly—suggesting a mildly progressive pattern among actual beneficiaries. This apparent paradox arises because lower-income households are both less likely to carry out retrofitting and, when they do, less likely to finance it through public subsidies. The analysis identifies key barriers that limit access for lower-income households, including lack of awareness, limited tax liability, and financing constraints. These results have important implications for the design of future green transition policies, emphasizing the need for targeted support mechanisms to ensure equitable participation and maximize both environmental and social benefits.

Keywords: Superbonus; Environmental subsidies; Distributive effects; Italian Survey of Consumer Expectations

JEL codes: D12, D31, H23, Q58

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1 Introduction

The building sector accounts for a significant share of global carbon emissions, and energy retrofitting of existing structures is widely recognized as a crucial strategy for achieving climate targets. Governments around the world have introduced various incentive schemes to promote retrofitting activities among households. However, concerns have been raised regarding the distributional impacts of such incentives: in particular, whether they disproportionately benefit higher-income households, thereby exacerbating existing inequalities. Understanding whether retrofitting incentives are regressive or progressive is essential for designing policies that support both the energy transition and social equity.

A growing body of literature has examined the distributional effects of environmental subsidies, including energy efficiency incentives, often finding that better-off households are more likely to access and benefit from these programs. Yet, empirical evidence remains mixed, with outcomes heavily influenced by program design, administrative barriers, and household characteristics. For example, in the US, Borenstein and Davis (2025) find that in the last two decades the bottom three income quintiles have received about 10% of all clean energy tax credits, while the top quintile has received about 60%, with even more extreme concentration in the case of electric vehicle subsidies. Similarly, Borenstein (2017) shows that solar adoption in California between 2007 and 2014 was dominated by high-usage, higher-income households, largely due to tiered electricity tariffs and net metering rules that amplify returns for wealthier consumers. Neveu and Sherlock (2016) find that tax credits for residential energy efficiency are "vertically inequitable", as lower-income households often lack the taxable income necessary to access the benefit. Outside the US, Lekavičius et al. (2020) show that in Lithuania, investment subsidies for residential renewable energy technologies increase inequality, since higher-income households are more likely to invest and receive larger public support. However, some technologies like heat pumps may be more evenly distributed: Davis (2024) finds little correlation between heat pump adoption and household income in the US, indicating that geographic and climatic factors can sometimes outweigh income effects.

Relatively few studies have analyzed the case of large-scale, highly generous incentive programs, such as the Italian Superbonus, which cost €124.2 billion between 2020 and 2024 (ENEA, 2024). Notable examples include the Federal Energy Tax Credits (2006–2021) (see, for instance, Borenstein, 2017) and the Residential Energy Efficiency Credits (2005–2011) in the United States, analyzed by Borenstein and Davis (2025); multiple investment subsidies for residential technologies in Lithuania—national-level programs partially supported by EU funds—examined by Lekavičius et al. (2020); and Germany's feed-in tariff scheme and renovation subsidies under the KfW (Kreditanstalt für Wiederaufbau) program, which have been evaluated in a cost-benefit analysis by Galvin (2024). In the Italian context, recent studies offer new insights into the distributive impacts of the Superbonus. Using household-level survey data, Del Ciello and Palmisano (2025) show that beneficiaries of the Superbonus 110% have significantly higher income and wealth levels than non-beneficiaries and that these differences persist across all geographic areas, suggesting a regressive distribution of benefits despite the program's intended universal accessibility. Complementing this, Giarda et al. (2025) find that uptake of the Superbonus and Ecobonus is concentrated among higher-income households, particularly in Northern Italy, and is closely linked to awareness and access to information. However, administrative data from the Italian Parliamentary Budget Office suggest a more nuanced picture: while the Superbonus remains concentrated in wealthier areas, it has also increased uptake in lower-income municipalities and doubled the share of resources allocated to Southern Italy (Ufficio Parlamentare di Bilancio, 2023). Together, these studies underscore the need to redesign large-scale incentive schemes to promote more equitable participation and avoid exacerbating existing inequalities.

This paper contributes to the literature by providing new evidence on the distributional effects of retrofitting incentives through an analysis of the Italian "Superbonus" program, a flagship initiative offering a 110% tax credit for energy retrofitting investments. Drawing on an original household-level survey specifically designed for this study, we examine whether access to and uptake of the Superbonus has been regressive across different income groups. We document both the overall distributional impact and differences among households that have undertaken retrofitting works.

Our findings offer a nuanced perspective on the distributional effects of retrofitting incentives. While access to these incentives has been mildly regressive across the general population—meaning that higher-income households have received a larger share of public support relative to their income—the distribution among actual beneficiaries appears mildly progressive. This apparent contradiction is explained by the fact that lower-income households are both less likely to undertake retrofitting works and, when they do, tend to receive lower amounts of public support. The paper further examines the barriers that limit lower-income households' access to both retrofitting works and the associated public incentives. These barriers include limited awareness of the programs, constraints related to taxable income, and differences in environmental attitudes. The findings carry important policy implications for the design of future green transition programs, particularly in ensuring equitable access and fostering broad participation.

The paper is structured as follows. Section 2 provides institutional background on energy retrofitting incentives in Italy. Section 3 describes the survey design and presents descriptive statistics of the data. Section 4 outlines the empirical results, and finally, Section 5 concludes with a summary of the main findings and provides policy implications.

2 Institutional Background

Italy has implemented a range of policy instruments to incentivize energy efficiency improvements in the residential sector. Among these, the Ecobonus and the Superbonus represent the most significant initiatives, both in terms of financial magnitude and potential impact on building stock decarbonization.

The Ecobonus was introduced in 2007 and gradually expanded in subsequent years. It offers tax deductions for energy efficiency measures carried out in residential and commercial buildings. Eligible interventions include thermal insulation, installation of high-efficiency heating and cooling systems, replacement of windows and doors, and the deployment of renewable energy systems such as solar panels. The deductions range between 50% and 65% of the eligible expenditures, depending on the type of intervention and the extent of energy savings achieved. The deduction is typically spread over 10 annual installments and can be used to offset personal income tax (IRPEF) or corporate income tax (IRES) liabilities. In principle, the Ecobonus is available to all property owners and tenants, but actual uptake depends on households having sufficient tax liability to absorb the credit.

In response to the COVID-19 crisis and as part of a broader strategy to stimulate the economy and accelerate the green transition, the Italian government introduced the Superbonus in May 2020 through Decree-Law 34/2020 (the "Relaunch Decree"). The Superbonus significantly enhanced the existing Ecobonus by raising the deduction to 110% of eligible expenses for a limited period. This allowed households to carry out retrofitting interventions at effectively no cost, and even to generate a small surplus. The Superbonus applies to a limited set of "driving interventions", which must be present to trigger eligibility. These comprise the thermal insulation of at least 25% of the building's external surface and the replacement of centralized heating and cooling systems in condominiums or single-family homes.

Once a driving intervention is carried out, a range of additional "secondary" interventions become eligible under the 110% deduction, including: the installation of photovoltaic systems, electric vehicle charging stations, and seismic retrofitting ("Sismabonus"). Originally, the Superbonus was available for works carried out between July 2020 and December 2021, but the program was later extended through 2022, and then again with reduced benefits through 2023 and 2024, albeit with growing restrictions on eligible recipients and a gradual reduction in the deduction rate.

A key innovation of the Superbonus was the introduction of credit transfer and invoice discounting mechanisms. These allowed beneficiaries to transfer the tax credit to a third party, such as a bank or an energy service company. Moreover, beneficiaries could obtain an immediate discount on the invoice from the contractor, who could then recover the credit. These mechanisms greatly expanded access to the incentive, particularly for households that lacked the liquidity or tax liability to benefit from traditional deductions. However, concerns about fraud and fiscal sustainability led the government to tighten regulations in 2022 and 2023, including stricter documentation requirements and limits on the number of credit transfers.

Both the Ecobonus and Superbonus are available to a broad set of beneficiaries, including private individuals, condominiums, cooperatives and non-profit organizations, as well as public housing authorities (for some measures). Eligible properties include both primary and secondary residences, though certain limitations have been imposed over time—particularly for single-family homes and higher-income households. Notably, the program required compliance with technical standards and energy performance improvements of at least two energy classes, verified through an Energy Performance Certificate (EPC) before and after the intervention.

3 Survey Design and Descriptive Statistics

3.1 The Italian Survey of Consumer Expectations

The Italian Survey of Consumer Expectations (ISCE) gathers data on demographic characteristics, income, wealth, consumption, and economic expectations and beliefs of a representative sample of Italian households with household heads aged 18 to 75 years, drawn from a nationally representative sample of 120,000 registered panellists. The sample is stratified to reflect the Italian resident population based on key demographic and socioeconomic criteria, including area of residence, age group, gender, level of education, employment status, and municipality size. Each respondent is assigned a sample weight to ensure that the overall sample reflects the actual proportions of the reference population. The survey is administered using the Computer-Assisted Web Interviewing (CAWI) method. It is conducted quarterly, starting in October 2023, and takes place in January, April, July, and October.

In each wave, the questionnaire is divided into two main sections: a core section, consisting of five parts that remain unchanged across waves, and special sections that change with each survey. The core section collects data on respondents' demographic characteristics, along with information on household income and financial and real wealth. Information on monthly consumption in different spending categories, including electricity and gas, is also reported. The core section ends with respondents' expectations regarding macroeconomic variables, such as economic growth, as well as the expected evolution of their income and their plans to purchase durable goods. The survey's special sections focus on topics that change over time, such as expectations regarding catastrophic risks, willingness to pay for the prevention of natural disasters, a hypothetical lottery to gauge spending propensity, willingness to pay for healthcare costs, and basic awareness of artificial intelligence applications.

In this paper we concentrate on wave 5, conducted in October 2024, which includes 5,012 observations. The special section addresses dwellings' energy efficiency and comprises 12 questions investigating whether respondents have undertaken renovation works to improve the energy performance of their dwelling, the type of intervention, the expenditure incurred, and the extent of public grants received (if any). It also explores respondents' views on the Energy Performance of Buildings Directive (EPBD), their opinion on government actions to promote and incentivize energy efficiency projects, and the factors that encourage or deter energy efficiency interventions.[1]

3.2 Descriptive statistics

Table 1 provides summary statistics of our data. Roughly half of our respondents are women and live in the northern provinces of Italy. The age of the respondents ranges between 18 and 75 years with a mean of 49 years. About 30% of the respondents have a college degree, and an average household consists of 2.7 persons. Monthly income was measured using a scale with eleven categories, ranging from under €1000 to over €15,000. For our purposes, we have used the midpoint of the respective category, and top-coded monthly income at €6250. The average calculated like this amounts to roughly €2300. More than three quarters of the respondents live in a dwelling that they own. Compared to official statistics, our sample is very similar and thus representative of the Italian population. Therefore, we do not use sample weights in our analysis.

[1]For more detailed information on the survey's design and methodology, see Guiso and Jappelli (2024).

Table 1: Summary statistics

Variable	Min	Max	Mean	St. Dev.	N
Female	0	1	0.509	0.500	5,012
Age	18	75	48.467	14.157	5,012
Retired	0	1	0.185	0.388	5,012
Urban	0	1	0.241	0.428	5,012
College	0	1	0.304	0.460	5,012
Income	1,000	6,250	2,259.846	1,145.872	4,545
Household size	1	4	2.727	1.009	5,012
North Italy	0	1	0.460	0.498	5,012
Owner	0	1	0.773	0.419	4,958
Knowledge	0	1	0.685	0.464	5,012
Environmental attitudes	0	1	0.140	0.347	5,012
Retrofit	0	1	0.285	0.451	4,594
Superbonus	0	1	0.188	0.390	1,136
Ecobonus	0	1	0.441	0.497	1,136
Family resources	0	1	0.371	0.483	1,136
Retrofit cost	2	600,000	25,444.240	55,792.410	758

Regarding our main interest, we note that almost 30% of our respondents' dwellings have undergone energy-efficient retrofitting since 2020. The energy-related retrofits include external thermal insulation, window frames, boilers, and the installation of heat pumps or solar panels. For these kinds of retrofits, the Italian government provided subsidies either through the Superbonus or the Ecobonus. Almost 20% of respondents, who own the dwellings in which they reside and retrofitted (n=1136), took advantage of the Superbonus, and thus employed only public money for the retrofit, while 44% only partially used public subsidies via the Ecobonus. The remainder of 37% has paid the retrofits with family resources only. The costs of the retrofits amounts to up to €600,000 with an average of €25,000. Due to several item non-response, the number of observations for this cost estimate is n=758.[2] Finally, we elicited whether respondents knew the European legislation for retrofitting and the reasons for retrofitting. If they responded that reducing greenhouse gas emissions was one factor, we use this as an proxy for measuring pro-environmental attitudes.

[2] In our sample, 4.2% of respondents used the Superbonus, a figure comparable to the 1.8% reported by the Bank of Italy's Survey of Household Income and Wealth (SHIW) for 2022.

4 Results

Our main interest is in the uptake of public subsidies when retrofitting the dwelling. To this end, we first calculate the amount of public money respondents received for the retrofit by multiplying the cost of the retrofit with the share of the public contribution to the costs of the retrofits. If households did not retrofit or did not use any public money, we assign a contribution of zero.

We start our analysis by showing the distribution of public funds received for the retrofit across income. Figure 1 plots the concentration curve for income, mapping the cumulative fraction of total income reported in the survey on the cumulative fraction of public money for retrofits. For instance, we learn that the first 25% of households represent less than 10% of all public subsidies, and the bottom 50% receives about 30% of all subsidies. In turn, the top 10% of income earners represent about 20% of public subsidies. The Gini coefficient of this concentration curve amounts to .255; as a comparison, for Italy's income distribution, it amounts to .311. Hence, the distribution of public subsidies for retrofitting are mildly regressive across the entire population.[3]

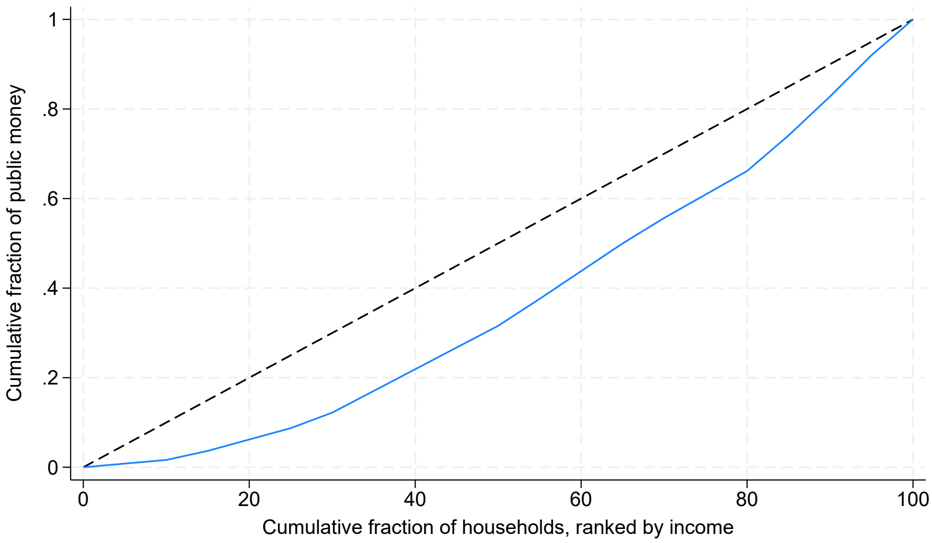

Figure 1: Concentration curve for all households

[3]Figure B1 in the appendix illustrates the distribution of the Superbonus and the Ecobonus, respectively. It shows that the Ecobonus is somewhat more unequally distributed. The Gini coefficient on the distribution of the Superbonus amounts to .216 and to .328 for the Ecobonus. Despite this difference, for most analyses of the paper, we group them and refer more generally to public funds.

One reason for the unequal distribution of public funds across income groups could be owed to differences in the probability to retrofit. To test this channel, we estimate a simple linear probability model (LPM), where the dependent variable is the probability that the household's dwelling was energetically retrofitted in the five years prior to the survey. As dependent variables, we include the characteristics from the superior panel in Table 1. For larger power in the income categories, we group the households into four equally large quartiles.[4]

Figure 2 illustrates the predictions for retrofitting across the income quartiles. It shows that less than 25% of households in the lowest income quartile live in dwellings that were retrofitted in five years prior to the survey. Importantly, the probability to retrofit increases with income. For the richest 25%, the probability of living in a retrofitted dwelling is about 10 percentage points higher. Moreover, Table B1 reveals that the dwellings are more likely to be retrofitted in the northern provinces of Italy, while retroffiting is less prevalent in urban areas. Furthermore, college graduates are somewhat more likely to live in retrofitted dwellings, while women are less likely. Environmental attitudes do not seem to matter for the energetic status of the dwelling. For a more detailed analysis, we refer to Giarda et al. (2025).

Next, we scrutinize the distribution of public funds over income, focusing only on households who live in retroffitted dwellings (Figure 3). We detect that the distribution is more equal compared to considering all households. To be precise, the Gini coefficient given this concentration curve amounts to .119. Figure 3 shows that first 25% of households in retroffitted dwellings represent less than 15% of all public subsidies, and the bottom 50% received about 45% of all subsidies. The top 10% of income earners represent slightly more than 10% of public subsidies. Hence, controlling for the different probabilities to retrofit explains a great deal of the regressivity related to the receiving public subsidies for energetic retrofits, but some is left.

[4]The full regression table is reported in the appendix (Table B1). We prefer to estimate an LPM because its coefficients can directly be interpreted as marginal effects and do not require a transformation as for other binary response models, e.g. probit and logit. Moreover, probit and logit models have strong funcional and distributional assumptions (Angrist and Pischke, 2009, p. 197f.). As a robustness check, we also estimate a probit model. The marginal effects are very similar to those reported here.

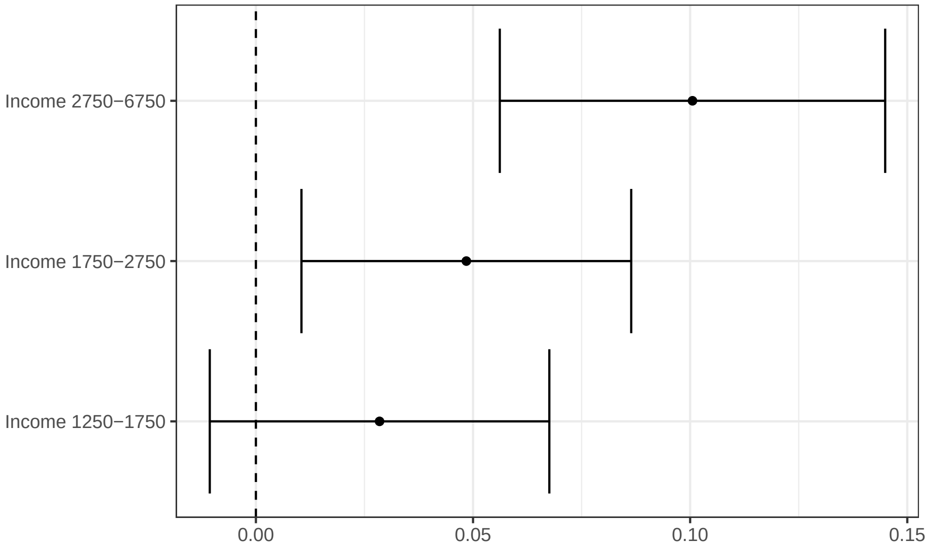

Figure 2: Income and the probability to retrofit
Note: The dots represent the coefficients on income groups using OLS, where the dependent variable is binary and indicates whether the household's dwelling was retrofitted in the five years prior to the survey. The whiskers represent the 95% confidence interval. N=4212.

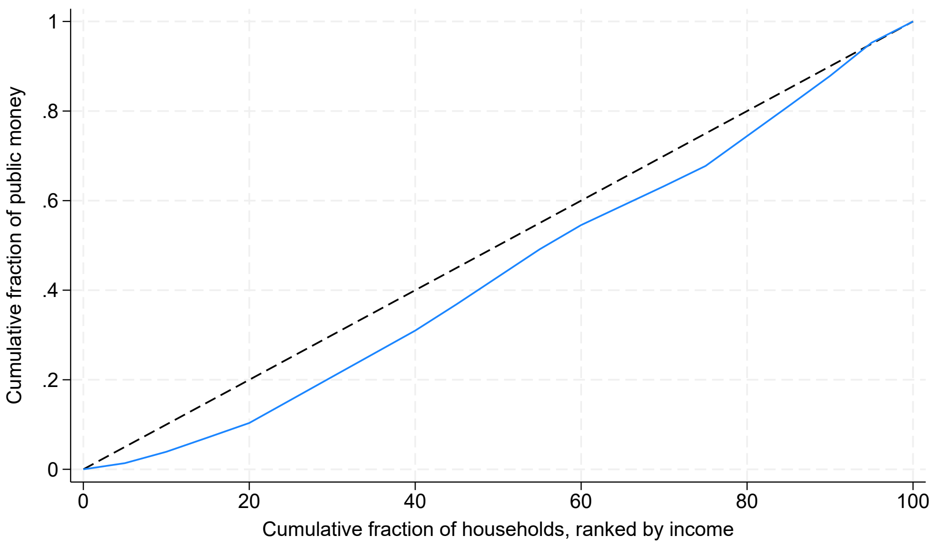

Figure 3: Concentration curve for all households who live in retrofitted dwellings

Again, we try to find reasons for why the distribution of funds is unequally distributed across income groups. Specifically, we provide two reasons: Richer households (i) tend to spend more money on retrofits and (ii) finance a larger share of the cost with public money. First, we estimate an OLS model (see Table B2 for the estimation results) with the cost of the retrofit as dependent variable, controlling for the same covariates as before. The predicted cost figures in Figure 4 suggest that on average richer households have more expensive retrofits.[5] Yet, owed to the small number of observations and the large variation of costs, the confidence intervals span very large. Table B3 shows OLS regression results for the type of retrofitting and the number of retrofitting. Yet, we fail to detect that neither the likelihood of performing a certain type of retrofit nor the total number of retrofits is correlated with income (Table B3 in the appendix). Hence, it might be that richer households just install more expensive equipment (e.g. larger heat pumps or larger PV panels).

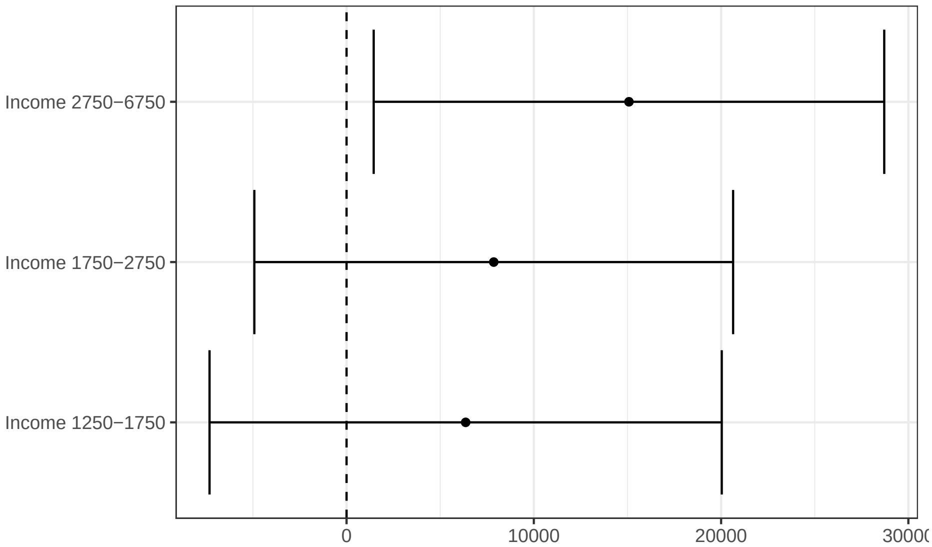

Figure 4: Income and cost of retrofit

Note: The dots represent the coefficients on income groups using OLS, where the dependent variable is the cost of the retrofit. The whiskers represent the 95% confidence interval. N=744.

Second, we test for differences in the share of the public contribution to the cost of the retrofit. Figure 5 plots the predicted share of public money to the total cost of the

[5]It also turns out that households with higher incomes are more likely to report cost figures. In the lowest income group, 62% report cost figures, while in the highest income groups, this share raises to 77.6%.

retrofit. We detect that on average the lowest income quartile receives a contribution of roughly 35% to the retrofit costs. The average share among households in the upper quartile is almost 10 percentage points higher (see estimation results in Table B4).

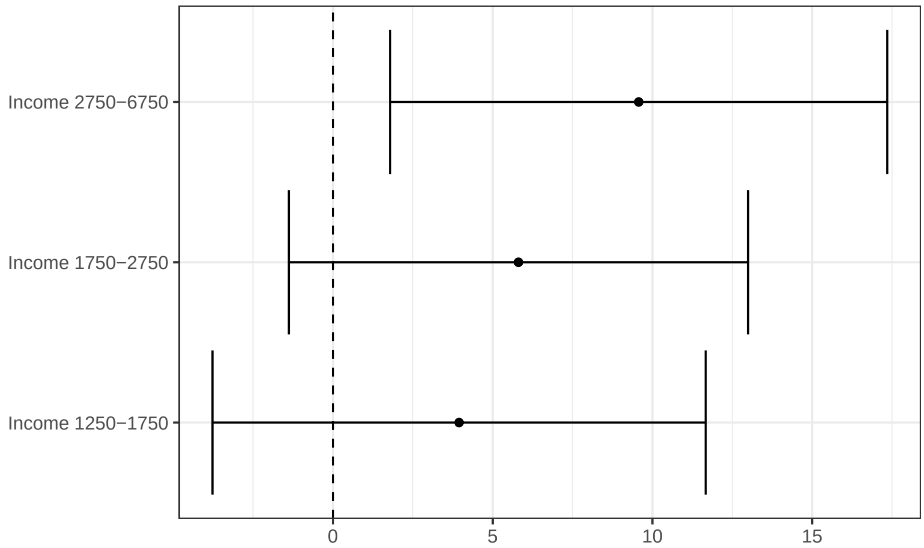

Figure 5: Income and share of public contribution
Note: The dots represent the coefficients on income groups using OLS, where the dependent variable is the share of public money received for the retrofit. The whiskers represent the 95% confidence interval. N=1010.

Another way to analyze this question is to check directly the origin of the funds used for the retrofits. To this end, we estimate a multinomial logit model where the dependent variable has three categories: (i) 100% public funds, (ii) 100% family resources, and (iii) a non-zero share of public funds, i.e. a mix of public and family resources (Table B5 in the appendix shows the marginal effects). Figure 6 shows that the predicted probability of using the Superbonus is roughly the same across all income groups at about 20%. However, respondents in the lowest income quartile tend to use the Ecobonus to a lower extent. Almost half of the respondents in the lowest income group use exclusively family resources for the retrofit. This share drops to about 30% in the highest income quartile. Finally, considering only households that live in retrofitted dwellings and used some share of public money for retroffitting, we note that the regressive effects completely disappear and the distributional impact appears mildly progressive (Figure 7).

Therefore, the regressive effects of the Superbonus are mainly driven by (i) a different likelihood to retrofit, (ii) higher cost of the retrofit, and (iii) a larger share of

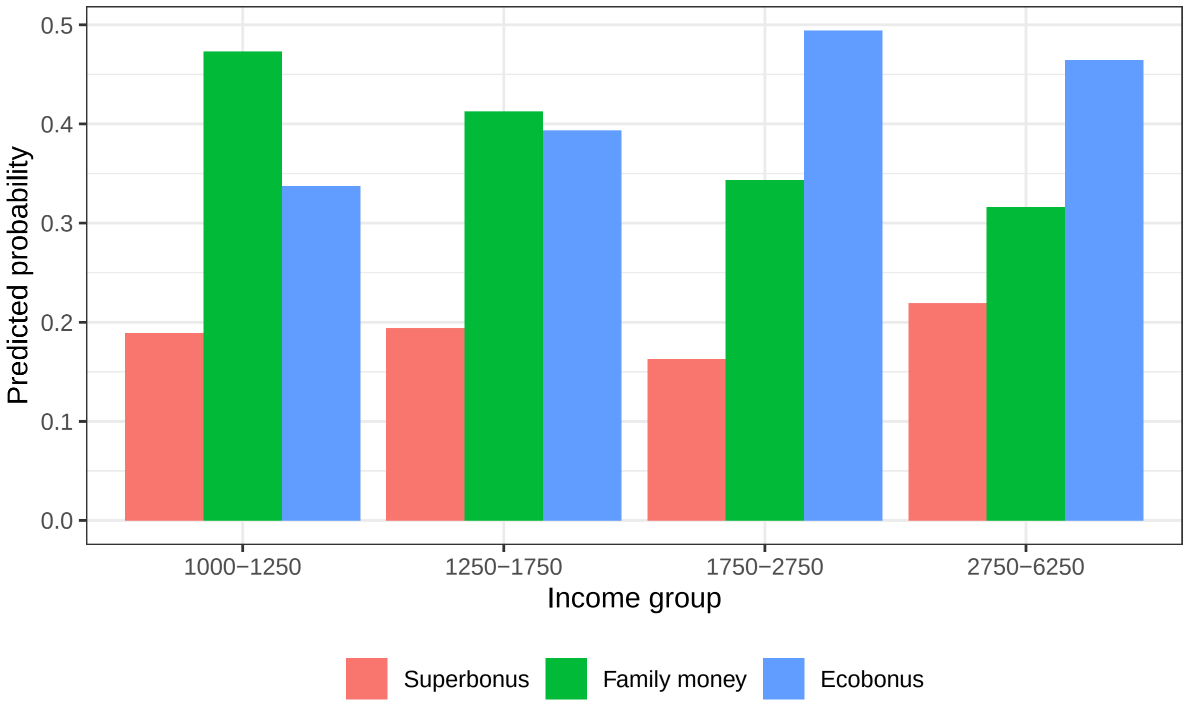

Figure 6: Predicted probability of resource use over income groups

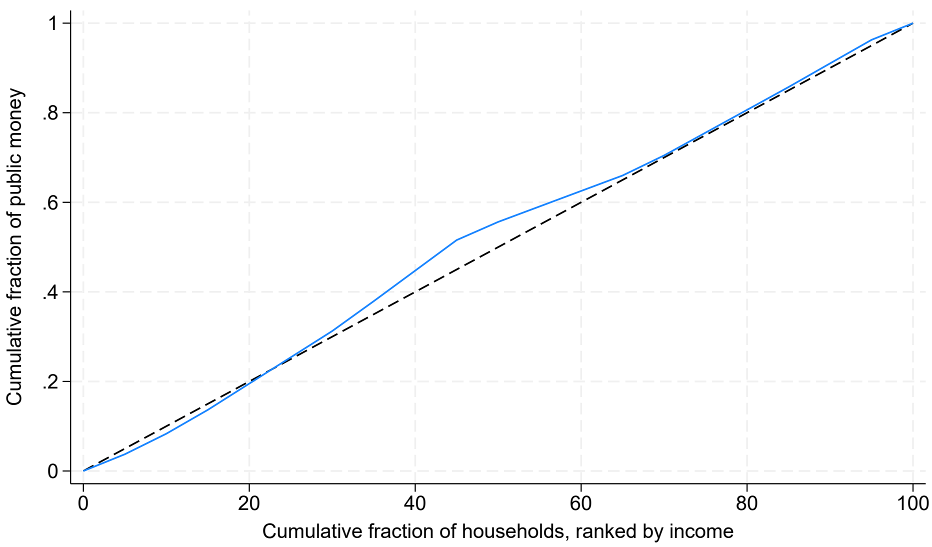

Figure 7: Concentration curve for all households who live in retrofitted dwellings and used some share of public money

family resources. In this section, we focus in the last reason and explore why low-income households refrain from using larger contributions from public funds.

First, we check for observable correlates with the decision to use family resources only for the retrofit. Table B5 shows the marginal effects of a multinomial logit where the origin of the funding is the dependent variable. Beyond income (Figure 6), only the residence in the northern provinces in Italy turns out to be statistically significant. To be precise, respondents in the north of Italy are 7.5 percentage points less likely to use family resources and would rather file for the Ecobonus. Moreover, we detect that the decision to use family money negatively correlates with the cost of the retrofit (Table B6). Similarly, it is negatively correlated with the number of works that are performed at the dwelling.

The survey contains a question that asks for reasons that could convince the respondents to undertake energetic retrofits. We analyze the reasons among respondents who live in retrofitted dwellings (Table B7). Model (1) suggests that respondents who use only family resources are less likely to state that financial aid could convince themselves or could convince others to retrofit. Moreover, Model (2) indicates that reporting the possibility to obtain bank credit at good terms as a driver of retrofit decisions is correlated with income but not with the origin of the funds to retrofit. Probably, credit constraints are not very relevant for respondents in the highest income quartile, but it seems it is perceived as a barrier. Regarding the lack of information as a barrier for retrofit investments, we do not find any correlation with income or the origin of money. Last, we test whether knowledge of the European guidelines on retrofitting is correlated with income, but we fail to detect this relationship.

Delving deeper, the survey asks respondents whether the government should intervene to incentivize households to retrofit their dwellings. Overall, a vast majority of respondents (90%) agree with this statement. Interestingly, respondents who use only family resources are five percentage points less likely to agree with the need for government support (first model in Table B8). Even among those respondents who agree that the government should intervene, respondents who used family resources for their retrofit report that the government should intervene to a lower degree. On average, these respondents report a 4 percentage points lower share given a mean of roughly 60%.

5 Conclusion

This paper examined the distributional effects of the Italian Ecobonus and Superbonus programs, highly generous tax incentives for energy retrofitting. Using household-level data from the Italian Survey of Consumer Expectations, we explored how the uptake of retrofitting works and the distribution of associated public funds vary across income groups.

Our analysis reveals that, across the general population, access to energy retrofitting incentives has been mildly regressive: higher-income households were more likely to undertake renovations and received a larger share of public subsidies. However, among those who accessed public money to retrofit their homes, public support was distributed more evenly—suggesting a mildly progressive pattern among actual beneficiaries, indicating that once engaged, lower-income households did not receive systematically less support relative to households with higher incomes.

The regressivity observed at the population level is largely driven by three factors: (1) lower likelihood of retrofitting among lower-income households, (2) higher retrofit costs incurred by wealthier households, and (3) greater reliance on private funding among the less affluent. Barriers such as limited financial resources, possible administrative complexity, the greater effectiveness of retrofit in colder, northern or wealthier regions, and differing attitudes toward public subsidies all contributed to the lower participation of low-income groups. The results of this study carry important implications for the design of equitable energy transition policies. Our findings suggest that the Ecobonus and Superbonus benefits have not been evenly distributed across income groups. In particular, lower-income households were significantly less likely to retrofit or to access the incentives in case of retrofitting, despite the program's high generosity.

These findings highlight a crucial tension in the design of environmental subsidies:

even highly generous programs may fail to achieve equitable outcomes without explicit mechanisms to ensure inclusivity. Future policy efforts should address the structural and informational constraints that hinder access for vulnerable households and consider complementing tax-based incentives with upfront grants, simplified procedures, and targeted outreach. To enhance the inclusiveness of future energy retrofitting schemes, policy-makers should consider complementing tax-based incentives with upfront grants or fully transferable credits that are accessible to low-income households. In addition, targeted outreach and support programs—especially in areas with lower educational attainment or weaker administrative capacity—may help reduce informational and procedural barriers. Finally, incorporating distributional impact assessments into the design and evaluation of green subsidies could help ensure that climate policy contributes to both environmental and social goals.

These considerations extend beyond the Italian context. As many European countries scale up their climate-related spending, the design of retrofit support measures must explicitly account for equity and access. Without targeted interventions, there is a risk that well-intentioned green programs may reinforce existing socio-economic disparities rather than reduce them.

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A Appendix

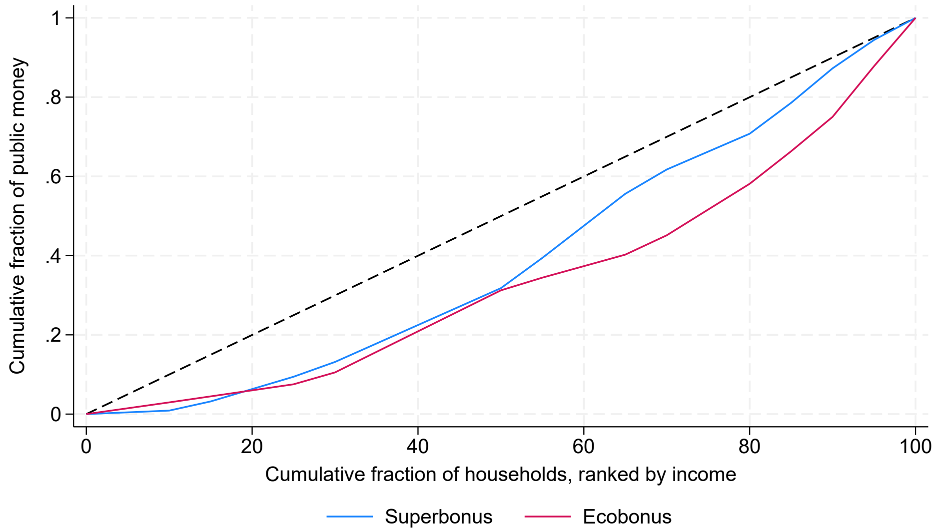

Figure B1: Concentration curve for people who took the Superbonus or Ecobonus

Table B1: LPM results for the probabiltiy to retrofit

	Dependent variable:
	Pr(retrofit=1)
Female	−0.031** (0.014)
Age	−0.001 (0.001)
Retired	0.063*** (0.023)
Urban	−0.032* (0.016)
College	0.031* (0.016)
Income 1250-1750	0.028 (0.020)
Income 1750-2750	0.048** (0.019)
Income 2750-6750	0.101*** (0.023)
Owner	0.123*** (0.017)
Household size=2	0.014 (0.024)
Household size=3	0.017 (0.024)
Household size=4	0.013 (0.025)
North Italy	0.058*** (0.014)
Environmental attitudes	0.015 (0.020)
Constant	0.137*** (0.041)
Observations	4212
Adjusted R^2	0.035

Note: *p<0.1; **p<0.05; ***p<0.01

Table B2: LPM results for the cost of retrofitting

	Dependent variable:
	Cost of retrofit
Female	−5,886.140 (4,302.373)
Age	−530.908** (210.104)
Retired	12,731.120* (6,567.373)
Urban	−3,037.425 (4,961.806)
College	−1,913.447 (4,783.362)
Income 1250-1750	6,360.579 (6,966.051)
Income 1750-2750	7,859.415 (6,510.850)
Income 2750-6250	15,080.490** (6,943.314)
Household size=2	−1,624.978 (7,698.308)
Household size=3	−528.516 (7,920.707)
Household size=4	1,543.164 (8,244.735)
North Italy	680.347 (4,353.996)
Environmental attitudes	−2,350.229 (5,748.844)
Constant	44,669.130*** (13,184.670)
Observations	744
Adjusted R^2	0.005

Note: *p<0.1; **p<0.05; ***p<0.01

Table B3: LPM results for kind of retrofitting

	Dependent variable:					
	Coat	Frames	Boiler	Heat pump	PV panel	No. of retrofits
Female	−0.038 (0.026)	−0.058* (0.030)	0.014 (0.030)	−0.044* (0.025)	0.013 (0.026)	−0.116* (0.068)
Age	0.0001 (0.001)	0.002 (0.001)	−0.00005 (0.001)	0.002 (0.001)	−0.001 (0.001)	0.004 (0.003)
Retired	−0.053 (0.040)	−0.024 (0.047)	−0.013 (0.047)	−0.042 (0.040)	−0.010 (0.041)	−0.136 (0.107)
Urban	−0.033 (0.030)	0.012 (0.035)	−0.021 (0.035)	−0.004 (0.030)	−0.093*** (0.030)	−0.147* (0.080)
College	0.039 (0.029)	0.061* (0.033)	0.001 (0.033)	0.019 (0.029)	−0.033 (0.029)	0.099 (0.076)
Income 1250-1750	−0.038 (0.039)	−0.033 (0.045)	0.023 (0.046)	−0.049 (0.039)	−0.042 (0.039)	−0.108 (0.104)
Income 1750-2750	−0.019 (0.037)	−0.013 (0.043)	0.028 (0.043)	0.028 (0.037)	0.0005 (0.037)	0.060 (0.098)
Incime 2750-6250	−0.009 (0.040)	−0.012 (0.047)	0.049 (0.047)	0.048 (0.040)	0.063 (0.041)	0.163 (0.107)
Owner	−0.038 (0.038)	0.091** (0.044)	0.001 (0.044)	0.092** (0.038)	0.059 (0.038)	0.207** (0.100)
Household size=2	−0.023 (0.045)	−0.017 (0.052)	−0.057 (0.052)	−0.019 (0.044)	0.026 (0.045)	−0.095 (0.118)
Household size=3	0.021 (0.046)	−0.028 (0.053)	−0.020 (0.054)	−0.045 (0.046)	−0.001 (0.046)	−0.083 (0.122)
Household size=4	0.028 (0.047)	−0.019 (0.055)	−0.055 (0.055)	−0.056 (0.047)	0.102** (0.048)	−0.017 (0.126)
North Italy	−0.012 (0.026)	−0.083*** (0.030)	0.026 (0.031)	−0.029 (0.026)	−0.067** (0.026)	−0.134* (0.069)
Environmental attitudes	0.042 (0.035)	−0.020 (0.041)	−0.005 (0.041)	0.037 (0.035)	0.017 (0.035)	0.053 (0.093)
Constant	0.310*** (0.077)	0.425*** (0.089)	0.520*** (0.090)	0.133* (0.076)	0.265*** (0.077)	1.652*** (0.203)
Observations	1,211	1,211	1,211	1,211	1,211	1,211
Adjusted R^2	0.004	0.008	−0.008	0.009	0.026	0.012

Note: *p<0.1; **p<0.05; ***p<0.01

Table B4: LPM results for share of public money to retrofit

	Dependent variable:
	Share of public money
Female	−3.608 (2.502)
Age	−0.079 (0.120)
Retired	−2.106 (3.855)
Urban	−1.936 (2.929)
College	−0.861 (2.806)
Income 1250-1750	3.949 (3.933)
Income 1750-2750	5.808 (3.663)
Income 2750-6250	9.572** (3.964)
Household size=2	−6.080 (4.457)
Household size=3	−6.078 (4.614)
Household size=4	0.170 (4.763)
North Italy	2.312 (2.559)
Environmental attitudes	0.127 (3.406)
Constant	44.803*** (7.484)
Observations	1010
Adjusted R^2	0.008

Note: *p<0.1; **p<0.05; ***p<0.01

Table B5: MNL results for the choice of funding

	Superbonus		Family resources		Ecobonus	
	Marg. Eff.	Std. Err.	Marg. Eff.	Std. Err.	Marg. Eff.	Std. Err.
Female	-0.027	(0.025)	0.038	(0.030)	-0.011	(0.031)
Age	0.000	(0.001)	0.001	(0.001)	-0.001	(0.001)
Retired	-0.054	(0.040)	0.019	(0.047)	0.035	(0.048)
Urban	-0.027	(0.030)	0.022	(0.036)	0.004	(0.037)
College	-0.011	(0.028)	-0.013	(0.034)	0.024	(0.035)
Income 1250-1750	0.005	(0.039)	-0.059	(0.049)	0.055	(0.048)
Income 1750-2750	-0.027	(0.036)	-0.127**	(0.046)	0.154**	(0.045)
Income 2750-6250	0.030	(0.041)	-0.154**	(0.049)	0.124*	(0.049)
Household size=2	-0.057	(0.046)	0.052	(0.052)	0.005	(0.056)
Household size=3	-0.015	(0.048)	0.087	(0.054)	-0.072	(0.058)
Household size=4	0.004	(0.050)	0.021	(0.055)	-0.025	(0.060)
North Italy	-0.018	(0.025)	-0.073*	(0.031)	0.091**	(0.031)
Environmental attitudes	0.041	(0.032)	0.037	(0.041)	-0.078	(0.043)
No. of observations	1054		1054		1054	

Note: *p<0.1; **p<0.05; ***p<0.01

Table B6: LPM for using family money

	Dependent variable:	
	Cost of retrofit	No. of retrofit
Family resources	−43,317.930*** (6,109.467)	−1.240*** (0.092)
Ecobonus	−39,239.340*** (6,010.237)	−1.030*** (0.090)
Female	−4,541.427 (4,161.937)	−0.130* (0.067)
Age	−564.718*** (203.055)	0.004 (0.003)
Retired	13,784.400** (6,346.809)	−0.079 (0.104)
Urban	−3,053.273 (4,794.236)	−0.117 (0.079)
College	−1,710.106 (4,621.856)	0.111 (0.075)
Income 1250-1750	6,152.435 (6,742.359)	−0.047 (0.106)
Income 1750-2750	9,165.408 (6,352.819)	0.089 (0.099)
Income 2750-6250	14,688.440** (6,754.237)	0.118 (0.108)
Households size=2	−1,085.628 (7,439.754)	−0.051 (0.120)
Households size=3	−1,345.329 (7,654.068)	−0.043 (0.124)
Households size=4	−1,027.456 (7,978.388)	−0.005 (0.128)
Nord	731.835 (4,222.829)	−0.104 (0.069)
Environmental attitudes	−4,032.262 (5,566.205)	0.085 (0.092)
Constant	81,219.040*** (13,674.110)	2.690*** (0.210)
Observations	744	1,054
Adjusted R^2	0.072	0.162

Note: *p<0.1; **p<0.05; ***p<0.01

Table B7: Reasons for using family resources

	Dependent variable:			
	State aid	Bank credits	Information	Knowledge
Family resources	−0.099** (0.042)	0.024 (0.031)	−0.045 (0.037)	−0.016 (0.038)
Superbonus	0.078* (0.041)	0.020 (0.031)	−0.055 (0.036)	−0.025 (0.037)
Female	0.004 (0.030)	−0.036 (0.023)	−0.006 (0.027)	−0.066** (0.028)
Age	−0.001 (0.001)	−0.002** (0.001)	−0.001 (0.001)	0.003** (0.001)
Retired	0.087* (0.047)	0.002 (0.035)	0.036 (0.042)	−0.028 (0.043)
Urban	0.001 (0.036)	0.0002 (0.027)	0.056* (0.032)	−0.017 (0.033)
College	0.035 (0.034)	−0.012 (0.026)	−0.004 (0.030)	0.108*** (0.031)
Income 1250-1750	0.051 (0.048)	0.045 (0.036)	0.018 (0.043)	0.089** (0.044)
Income 1750-2750	0.029 (0.045)	0.028 (0.034)	0.029 (0.040)	0.005 (0.041)
Income 2750-6750	0.070 (0.049)	0.067* (0.037)	0.008 (0.043)	0.045 (0.045)
Household size=2	0.027 (0.054)	0.010 (0.041)	−0.013 (0.048)	0.053 (0.050)
Household size=3	0.039 (0.056)	−0.004 (0.042)	0.012 (0.050)	0.034 (0.051)
Household size=4	0.011 (0.058)	0.030 (0.044)	0.052 (0.052)	−0.006 (0.053)
North Italy	0.057* (0.031)	−0.039* (0.023)	0.043 (0.028)	−0.035 (0.028)
Environmental attitudes	0.013 (0.042)	−0.0001 (0.031)	0.100*** (0.037)	0.032 (0.038)
Constant	0.525*** (0.095)	0.253*** (0.071)	0.232*** (0.084)	0.543*** (0.087)
Observations	1,054	1,054	1,054	1,054
Adjusted R^2	0.031	0.008	0.006	0.023

Note: *p<0.1; **p<0.05; ***p<0.01

Table B8: Government aid

	Dependent variable:	
	Binary	Share
Family resources	−0.051** (0.023)	−3.546* (1.830)
Superbonus	−0.018 (0.023)	−0.897 (1.780)
Female	0.018 (0.017)	−1.974 (1.335)
Age	0.002** (0.001)	0.120* (0.065)
Retired	−0.006 (0.026)	−4.001* (2.044)
Urban	−0.010 (0.020)	1.118 (1.579)
College	0.008 (0.019)	−1.833 (1.493)
Income 1250-1750	0.047* (0.027)	−5.067** (2.140)
Income 1750-2750	0.041 (0.025)	−7.834*** (2.002)
Income 2750-6750	0.029 (0.027)	−11.203*** (2.167)
Household size=2	−0.002 (0.030)	6.146** (2.404)
Household size=3	−0.018 (0.031)	6.004** (2.472)
Household size=4	−0.051 (0.032)	9.074*** (2.563)
North Italy	−0.014 (0.017)	−2.556* (1.367)
Environmental attitudes	0.032 (0.023)	−0.493 (1.793)
Constant	0.856*** (0.053)	59.123*** (4.210)
Observations	1008	915
Adjusted R^2	0.010	0.047

Note: *p<0.1; **p<0.05; ***p<0.01